

# The Mining Journal

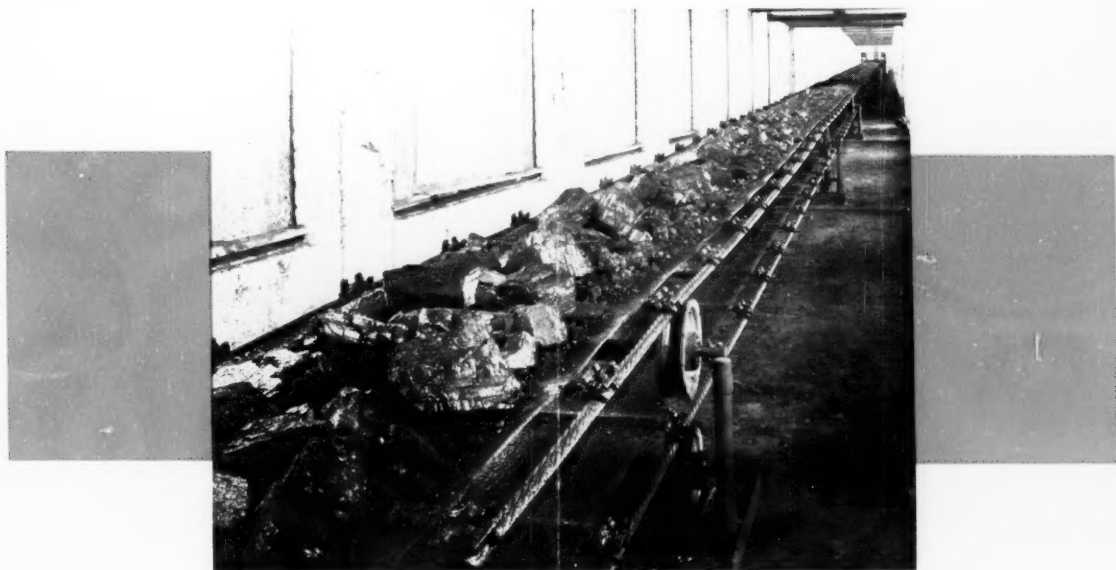
Established 1835

Railway & Commercial Gazette

Vol. CCXLIII No. 6203

LONDON, JULY 9, 1954

PRICE 8d.



*Cable Belt Conveyor handling 300 tons per hour run of mine coal. Length of conveyor 1,800 yards. Lift 600 ft.*

*Economic long distance material handling  
using a*

## **CABLE BELT CONVEYOR**

### ***Economies effected are***

**CAPITAL COST.** Initial cost usually lower than comparable conveyor installations.

**BELT COST.** Initial cost is low—belt wear is negligible—edge wear eliminated.

**MANPOWER SAVING.** Eliminates tandem point attendants, tub handlers, etc. and reduces number of men for cleaning up spillage.

**SPILLAGE.** Due to steadiness of system, spillage is negligible.

**MAINTENANCE.** Ropes supporting pulleys are pitched at approx. 20ft. intervals thereby greatly reducing lubrication. One C.B.C. replaces a series of conventional belt conveyors.

This means maintenance of only one Driving Unit and Tail End Unit.

**POWER.** Considerably less power required than for normal conveyor system.

**DEGRADATION OF MATERIAL.** Absence of tandem points reduces material degradation.

**APPLICATIONS.** The need to install conveyors in series is eliminated since much longer distances and higher lifts are now possible in one stage.

**FIRE RISK.** The special construction greatly reduces fire risk.

***LET US SOLVE YOUR TRANSPORT PROBLEMS***

**CABLE BELT LIMITED**

**ROSE STREET, INVERNESS**

Telephone: Inverness 62

Telegrams: Cablebelt, Inverness

- **NON-FERROUS METALS**
- **ORES AND MINERALS**
- **METALLIC RESIDUES**
- **METAL SCRAP**
- **FERRO ALLOYS**



YOUR INQUIRIES ARE SOLICITED

40 YEARS OF SERVICE TO  
THE MINING INDUSTRY

**IRON ORE**

**MANGANESE ORE**

**CHROME ORE**

**TUNGSTEN ORE**

*Philipp Brothers, Inc.*

70 Pine Street, NEW YORK 5, N. Y.,

Cables: PHIBRO  
New York, N. Y.

*Subsidiaries and affiliates in:*

AMSTERDAM • MONTREAL • TOKYO • BUENOS AIRES • MONTEVIDEO • LA PAZ • LIMA • CALCUTTA • BOMBAY • ISTANBUL

# **NEW**

## **HOLMAN IMPACT WRENCH**



Roof bolting with the Holman Impact Wrench.



MINERS are finding this latest newcomer to the Holman Pneumatic Tool range an extremely useful aid in roof bolting, especially when used in conjunction with the famous Holman Dryductor. Built to the high engineering standards of all HOLMAN tools, it is compact, light and easy to handle, transmitting the

minimum of torque reaction to the operator. *It gives a more powerful turning effect than any other portable torque-type wrench.* Wherever time and money can be saved by speeding the tightening or removal of nuts and bolts there is a job for the Holman Impact Wrench. May we send full details?

IMPACT WRENCH Size 404, powered by Holman Vane Type Motor. Suitable for  $\frac{3}{4}$ -in. heavy duty and 1-in. normal duty. Output Spindle takes 1-in. square drive chucks. Length 16 in. Weight 21 lb.

# **Holman**

**ROCK DRILLS • AIR COMPRESSORS • PNEUMATIC TOOLS**

HOLMAN BROS. LTD., CAMBORNE, ENGLAND • TELEPHONE: CAMBORNE 2275 (10 LINES) • TELEGRAMS: AIRDRILL, CAMBORNE HE14A

## A new radio-active ore detector

The new EKCO 'PROD' is the simplest type of Portable Radio-active Ore Detector. Weighing only 4½ lb., it can easily be carried about in one hand, and is always ready for use at the touch of its single control. The life of the Halogen-quenched G.M. tube is not affected by use and the instrument is operated by three inexpensive standard dry cells obtainable almost anywhere.

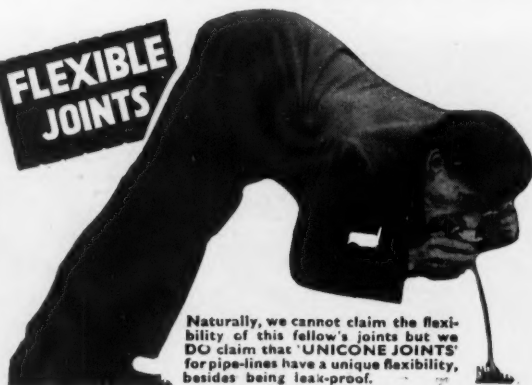
The 'PROD' is waterproof, ruggedly built and inexpensive. It can be handled with perfect efficiency by unskilled personnel who are merely required to note obvious increases in the rate of clicks through the headphones.

the **NEW** **EKCO**  
**'PROD'**

Portable Radio-active Ore Detector Type N533

EKCO ELECTRONICS LTD. SALES & SERVICE DEPTS.  
EKCO WORKS, SOUTHEND-ON-SEA, ESSEX, ENGLAND

**FLEXIBLE  
JOINTS**



Naturally, we cannot claim the flexibility of this fellow's joints but we DO claim that 'UNICONE JOINTS' for pipe-lines have a unique flexibility, besides being leak-proof.

Represented in—Scotland: Barnes & Bell, Ltd., 79 St. George's Place, Glasgow, C.2.; England: Hugh Wood & Co., Ltd., Team Valley Trading Estate, Gateshead-on-Tyne, 11; Hugh Wood & Co., Ltd., Industrial & Export Dept., Dashwood House, 69 Old Broad Street, London, E.C.2.; Watts Haray & Co., Ltd., Howdon Wagon Works, Howdon-on-Tyne; Northern Ireland: E. H. McConnell Metals Ltd., 3-5 Dalton Street, Bridge End, Belfast; South Wales: Tom Smith & Clarke, Ltd., New Cut Road, Swansea; Belgium, Belgian Congo and Luxembourg: Pierre Schoepp, 2 rue des Sarts, L'Everval, Belgium; Norway: Marstrand & Astrup A/S, Ingeniører, Sandvika Pr., Oslo; U.S.A.: De Long Associates, Springhouse, Pennsylvania; Holland: P. Van Leeuwen Jr's Buiszhandel N.V., Zwijndrecht, (Holland), P.O. Box 1; Sweden: A. B. Bosson-Rör Malmstilladsgatan 46, Stockholm.



THE UNICONE CO. LTD., RUTHERGLEN, GLASGOW, SCOTLAND

**WOLVERHAMPTON DIAMOND  
DIE & TOOL Co. Ltd.**

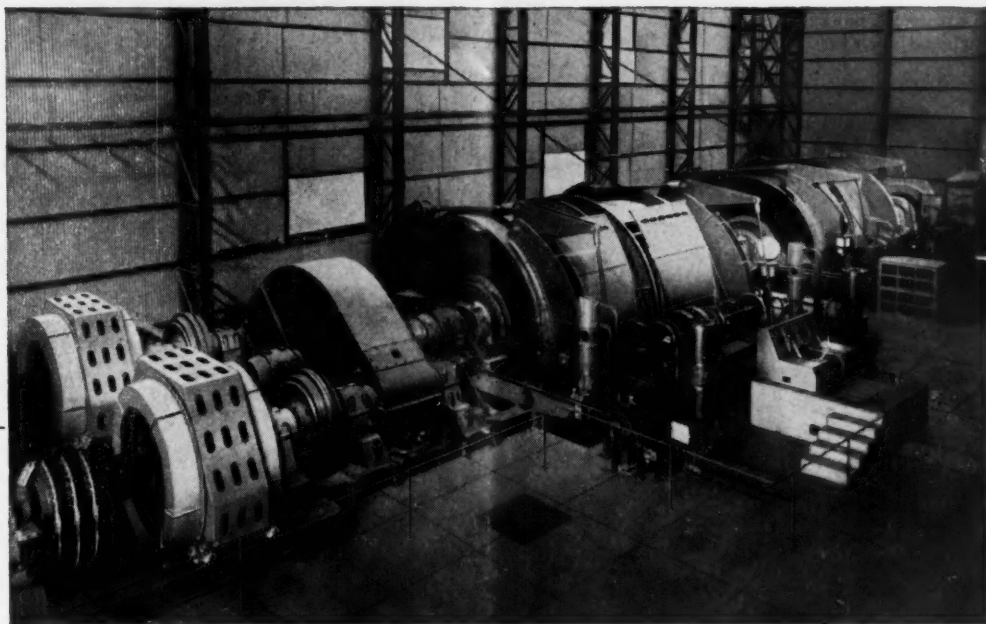
**BOARTS**  
*and*  
**INDUSTRIAL  
DIAMONDS  
Exporters**

**11 HATTON GARDEN,  
LONDON, E.C.1**

Telephone: **HOLborn 3017** Cables: **Pardimon, London**



## ***Twin A.C. hoists in South Africa***



'ENGLISH ELECTRIC' mining equipment is helping to increase the world's mineral output and in South Africa in particular hoists of progressive design are proving that the extensive experience of 'ENGLISH ELECTRIC' can meet the many problems associated with deep shaft mining.

The illustration shows the left- and right-hand twin A.C. hoists with

'ENGLISH ELECTRIC' patented series-connected rotors and D.C. dynamic braking at the No. 1 shaft of the South Lease Area Mine in the Orange Free State.

The rating of each hoist is 4,040 h.p., 6,600 volts, 370 r.p.m. Duplicate equipment is also installed at the No. 2 shaft.

## **'ENGLISH ELECTRIC'** **mine hoists**

THE ENGLISH ELECTRIC COMPANY LIMITED, QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

*Mining Division, Stafford*

WORKS: STAFFORD, PRESTON, RUGBY, BRADFORD, LIVERPOOL, ACCRINGTON

*"The DON people  
came along and sorted  
the job out"*

That's what we're  
in business for—to give  
you the answers and the  
service you require.  
The staffs of our nation-wide  
chain of service depots have  
the benefit of our more than 40 years'  
manufacturing experience behind them to  
make sure they give the *right* answers.  
If you've a brake or clutch problem, a phone  
call to your nearest 'DON' depot will  
find the solution



*...fit*



*to be sure*

DB/21B

Brake and Clutch Liners

*A Nation-wide  
chain of depots  
to serve you*

BELFAST 25103  
BIRMINGHAM 5  
Midland 4659  
BLACKBURN 6581  
BRISTOL 27214  
CARDIFF 27026  
CARLISLE 21589  
CHESTER 21280  
COVENTRY 64914  
EDINBURGH 1  
Central 4234  
EXETER 3817  
GLASGOW C2 Central 4595  
HULL Central 52072  
IPSWICH 3023  
LEEDS 3 20664/5  
LEYTON Leytonstone 6068  
LIVERPOOL  
Royal 1251 and 5202  
MANCHESTER 3  
Blackfriars 0596  
NEWCASTLE-ON-TYNE 2  
27142 and 27942  
NOTTINGHAM 43646  
SHEFFIELD 1 25529  
SOUTHAMPTON 71276  
STOKE-ON-TRENT 44021  
WIMBLEDON 4248/9  
Republic of Ireland:  
DUBLIN, 35 Westland Row  
66597  
**Small & Parkes Ltd**  
MANCHESTER 9  
LONDON: 76 Victoria Street,  
S.W.1.

## LONDON & SCANDINAVIAN METALLURGICAL CO LTD

**Manufacturing Metallurgists**

*Buyers for consumption  
in own and associated works  
in U.K. and abroad of*

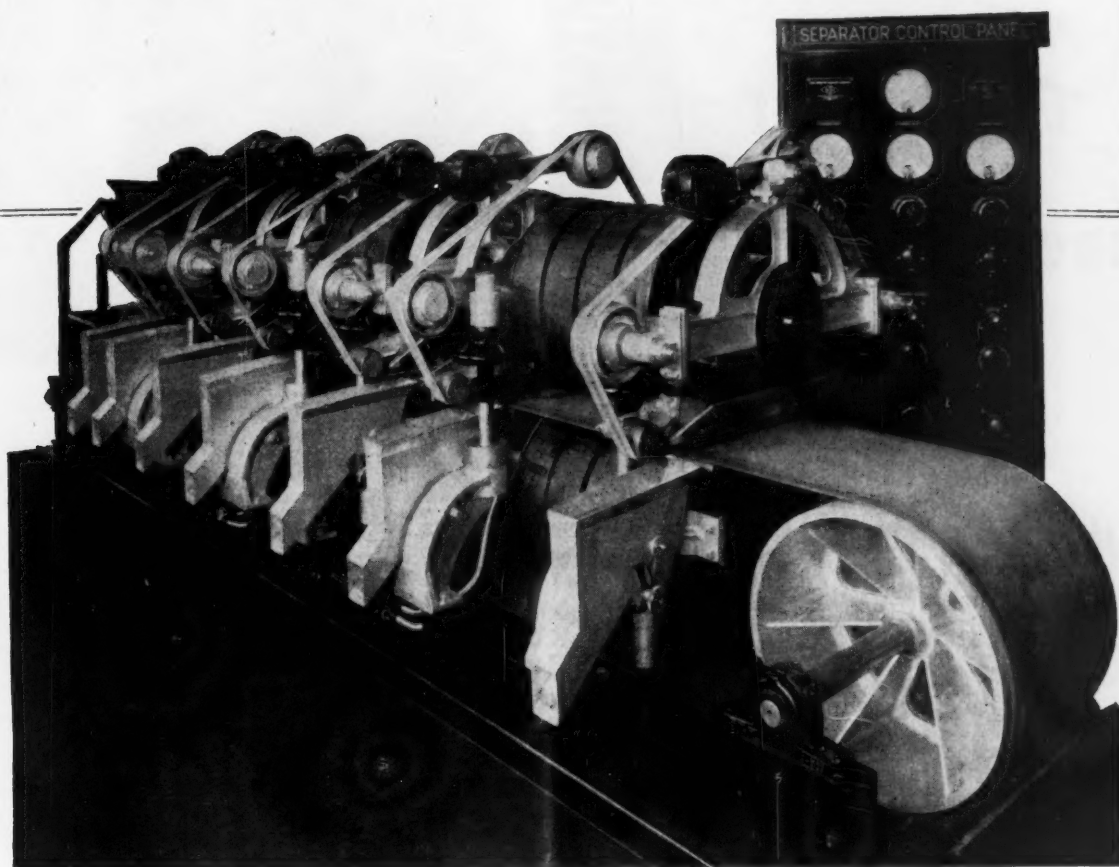
**ORES AND RESIDUES** containing

- COLUMBIUM
- TANTALUM
- WOLFRAM
- MOLYBDENUM
- VANADIUM
- CHROME
- MANGANESE
- TITANIUM

39 HILL ROAD LONDON SW19 Telephone WIMbledon 6321 Telegrams Metallurg London

## FOR THE TREATMENT OF FEEBLY MAGNETIC ORES

The Huntington, Heberlein high intensity magnetic separator is specially designed for the concentration of ores containing feebly magnetic minerals. The standard machine, which is of the cross belt type, is capable of separating seven products of varying magnetic characteristics and one non-magnetic fraction. The provision of a magnetic field of high intensity and a vibrating feed belt greatly increases the capacity and efficiency of separation of the machine.



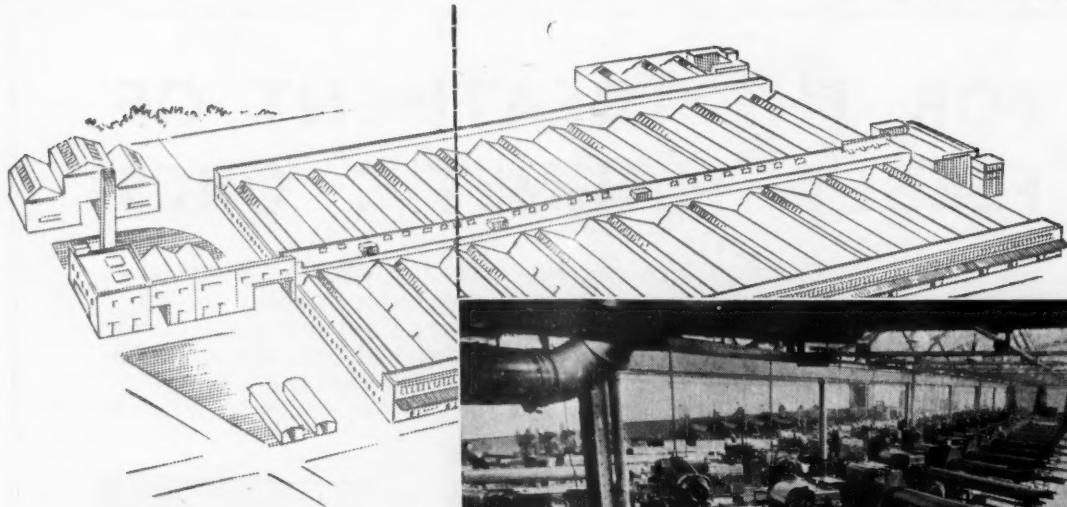
ALSO SPECIALISTS IN

Dwight-Lloyd sintering plants • Sink-and-float ore concentration plants • Ore roasting furnaces • Contact sulphuric acid plants  
Sulphuric acid concentration plants • Mechanical saltcake furnaces

*High intensity magnetic separators by*

**Huntington, Heberlein & Co. Ltd**





**TECALEMIT**  
specialisation  
begins  
in the factory



The great Tecalemit Plymouth factory, covering more than 407,500 sq. ft., is sub-divided into sections, each solely concerned with the production of one type of lubricating equipment.

This complete specialisation from drawing board to assembly, means that when a Tecalemit engineer recommends a lubricating system, you can be sure it was designed and built for that particular machine. There is no "making do" . . . no extensive modifications in an endeavour to fit equipment on machines for which it was never intended.

That's why Tecalemit Lubrication Systems are the most efficient you can install. They quickly pay for themselves too, in increased production and lowered running costs.

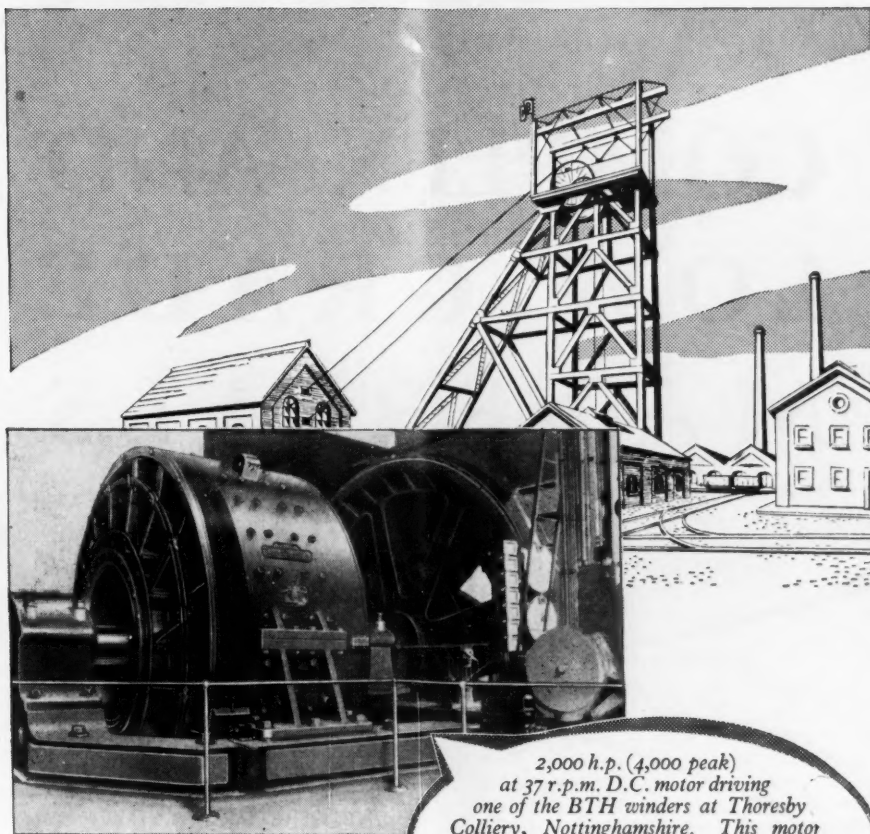
A Tecalemit representative will gladly call at your request.

**TECALEMIT**  
*The Authority on Lubrication*  
PLYMOUTH, ENGLAND





## ELECTRIC MINING EQUIPMENT *speeds production*



2,000 h.p. (4,000 peak)  
at 37 r.p.m. D.C. motor driving  
one of the BTH winders at Thoresby  
Colliery, Nottinghamshire. This motor  
hoists a pay-load of 10 tons per trip, and  
helped to achieve a record output of  
30,805 tons of coal in one week.

Above or below ground, BTH electric  
mining equipment—flameproof where required—  
provides power for the men employed in an essential industry.

## BRITISH THOMSON-HOUSTON

THE BRITISH THOMSON-HOUSTON COMPANY LIMITED · RUGBY · ENGLAND *Member of the AEEI group of companies*

A4728

### *Principal Overseas Representatives*

**AUSTRALIA**, Sydney :  
Australian General Electric  
Proprietary Ltd., G.P.O.  
Box 2517.  
Melbourne : Australian  
General Electric Proprietary  
Ltd., G.P.O. Box  
538F.

**CHINA** :  
Hong Kong : Inniss & Rid-  
dle (China) Ltd., 1st Floor  
David House, 67-69, Des  
Voeux Road Central.

**NEW ZEALAND**, Wellin-  
gton : National Electrical &  
Engineering Co., Ltd.,  
P.O. Box 1055.

**INDIA** : Associated Electri-  
cal Industries (India) Ltd.,  
Calcutta P.O. Box 271,  
Bombay P.O. Box 484.

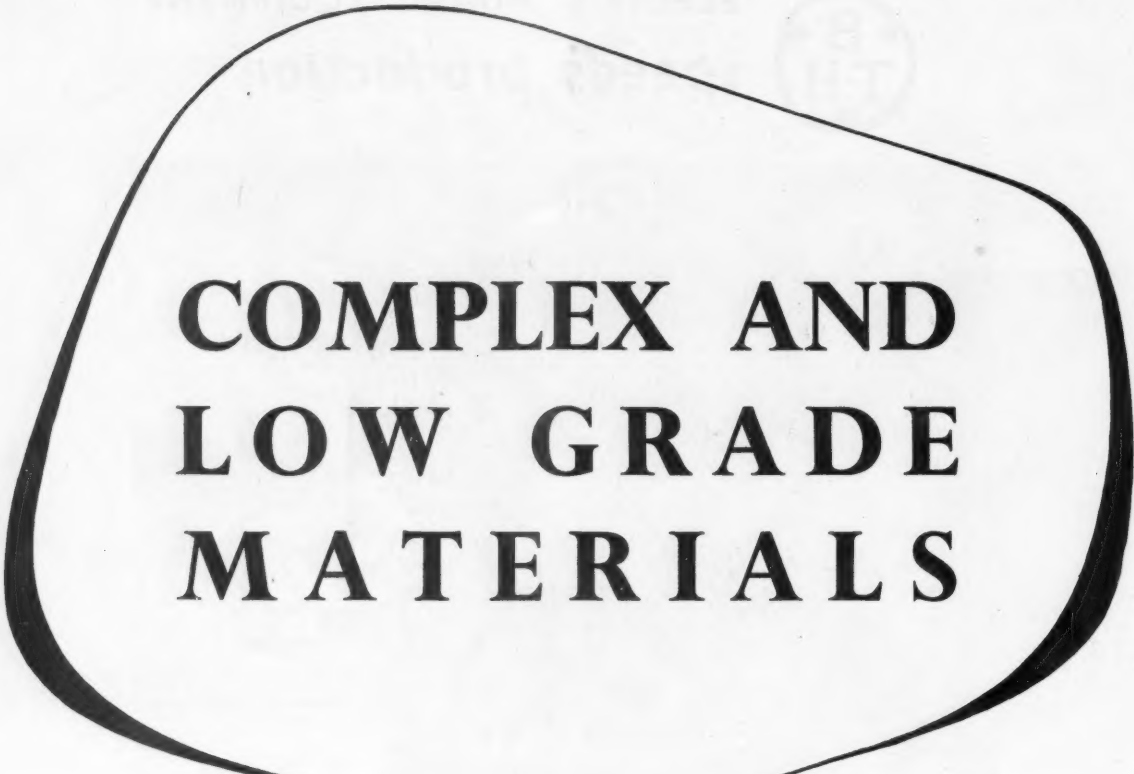
**PAKISTAN** : Associated  
Electrical Industries (Paki-  
stan) Ltd., Karachi P.O.  
Box 4958, Lahore P.O. Box  
146.

**SOUTH AFRICA**,  
Johannesburg : The British  
Thomson Houston Co.,  
(South Africa) (Pty), Ltd.,  
P.O. Box 482.  
Capetown : Wilson &  
Herd Engineering (Pty.),  
Ltd., P.O. Box 1459.

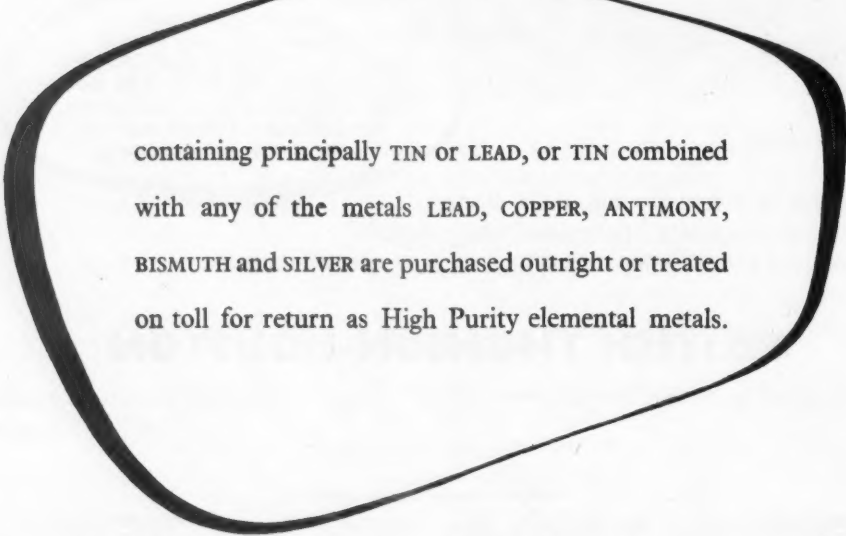
**WEST AFRICA**,  
Takoradi, Gold Coast,  
Colony : The West African  
Engineering Co., P.O.  
Box 100.

**RHODESIA**, Bulawayo :  
Johnson & Fletcher, Ltd.,  
P.O. Box 224.  
**KENYA COLONY**,  
A. Baumann & Co., Ltd.,  
P.O. Box 538 Nairobi.  
P.O. Box 323 Mombasa.  
**TANGANYIKA**,  
A. Baumann & Co., Ltd.,  
P.O. Box 277 Dar-es-  
Salaam.  
**UGANDA**,  
A. Baumann & Co., Ltd.,  
P.O. Box 335 Kampala.

*and others throughout the world*



# COMPLEX AND LOW GRADE MATERIALS



containing principally TIN or LEAD, or TIN combined  
with any of the metals LEAD, COPPER, ANTIMONY,  
BISMUTH and SILVER are purchased outright or treated  
on toll for return as High Purity elemental metals.

*Send us samples or detailed analyses*

## CAPPER PASS

CAPPER PASS AND SON LIMITED BEDMINSTER BRISTOL ENGLAND

# The Mining Journal

Established 1835

Vol. CCXLIII No. 6203

LONDON, JULY 9, 1954

PRICE 8d.

## CONTENTS

Notes and Comments	37
From Our Own Correspondent	38
Brazil; Australia.	
Diamonds in the Rand Mines	40
The Principles of Koepe Winding	41
Control and Testing of Water Base Drilling Mud	44
Machinery and Equipment	46

Metals, Minerals and Alloys	47
The Mining Markets	49
Company News and Views	50
Company Shorts	52
Company Meetings and Announcements	54
Frontino Gold Mines Limited; The Central Mining	
—Rand Mines Group.	

Published by The Mining Journal Ltd., at 15 Wilson Street, Moorgate, London, E.C.2. MONarch 2567 Subscription £2 per annum

## NOTES AND COMMENTS

### Uranium Resources of Great Britain

The uranium resources, which have as yet been found in Britain—almost all in Devon and Cornwall—are insufficient to warrant the erection of a plant to treat the ore, but they are, nevertheless, too large to be dismissed as of no account. This is the view put forward in the annual report of the Geological Survey of Great Britain for the year 1953 published last week.

Such an assessment of this country's known uranium resources is not unduly encouraging, particularly as the Survey estimates the cost of a plant to treat the ore at approximately £250,000. On the other hand, it must be assumed that investigations so far carried out merit further expenditure to determine more fully the potentiality of uranium resources in Britain as the Survey adds that efforts continue to be directed towards the discovery of a significant orebody.

The search for radio-active mineral occurrences included the exploration of the former uranium mine of South Terras which involved about 5,000 ft. of diamond drilling. Although high uranium values were obtained in diabase and killas country rock no payable extension of the old ore shoot or the existence of a new one was revealed. Investigations were also carried out on uranium shoots within the old copper lode at Wheal Edward, near St. Just, and other mines nearby and a new discovery of uranium ore was made towards the end of last year at Wheal Bray on Bodmin Moor.

The old mine dumps throughout Devon and Cornwall were subjected to a comprehensive radiometric survey to ensure that good uranium ore locally present in these tailings is not disposed of as road-metal as has happened in the past. In this connection the Survey states that during early trials with a car-mounted Geiger counter and scintillometer equipment a high radio-activity was found along many roads in the Midlands, these roads being metallised by a uranium-bearing slag derived from the smelting of naturally radio-active phosphate rock to elemental phosphorus. The contained uranium, however, is not considered to be recoverable economically although the slags have formed a cheap and convenient radio-active source for the training of air-raid wardens.

One of the most interesting disclosures in the Survey was that a high uranium content (.08 per cent in the ash) was found in a thin coal seam encountered in the Warwickshire coalfield. Similar uraniferous coals have been recognized from localities overseas and a report has, therefore, been written embodying suggestions on the geological environments in which exploration for these uraniferous coals might profitably be undertaken.

Whatever the future potentialities of this country's uranium resources might be, at present the uranium ore available cannot, at best, provide more than a very small part of the requirements of the Ministry of Supply. Thus attention continues to be directed towards exploration for new deposits within the British territories overseas. To facilitate exploration in the Colonies and elsewhere surveys were conducted with a Land Rover equipped with a self-recording Geiger counter and Scintillometer equipment. Leaving aside the several regions in which there occurred anomalous radio-activity meriting further investigation by local geologists, several new uranium sources were revealed in the Copperbelt of Northern Rhodesia which, the Survey points out, were in addition to the one small orebody currently in the course of development and which were within the same geological province as the rich pitchblende deposit of Shinkolobwe in the Belgian Congo.

### Turning Point for South African Gold Mining

Mr. Kenneth Richardson's presidential address delivered last week to the Transvaal and Orange Free State Chamber of Mines comes at a time which might well prove to be the turning point in the post-war fortunes of the South African gold mining industry.

The supply of native labour, he said, although still of some concern, is much more satisfactory than it has been for years past. The current total labour force employed in the industry is the highest for 11 years. Improvements in mining techniques together with increased mechanization are reflected in the higher productivity now being achieved. The rock handled in a month underground per native which in 1946 averaged 27.49 tons has risen steadily to a level last year of 33.04 tons, an increase of 20 per cent during the seven years; while the output of gold by mines associated



with the Transvaal and Orange Free State Chamber of Mines increased by 140,844 oz. to a total of 1,440,830 oz. during 1953 as compared with the previous year. This increase was, however, due mainly to the improvement in the grade of ore milled which followed the bringing into production of new mines working a considerably higher average grade of ore than the older mines. Better than this, however, were the results achieved during the first five months of the current year during which time production increased by no less than 334,551 oz. over the corresponding period of the previous year. On present showing there seems no reason why the current year's gold output should not exceed the total of 12,000,000 oz. for the first time since 1943.

Be all that as it may, working costs, he declared, continue to rise and during the first five months of 1954 reached 191s. 11d. per f.oz produced as compared with 184s. 4d. during the same period of 1953. During this period working costs per oz. were on the average 4s. 4d. higher than those during the whole year 1953 and 7s. 7d. above those of the first five months of last year. But these figures do not reveal the true picture because the average cost per oz. produced at the new mines of the Orange Free State rose by 34s. 8d. compared with the cost for the same period last year, while for the Transvaal mines the cost per oz. rose by only 4s. 7d.

Nevertheless the great strides which have been made since the beginning of the year are most encouraging. During this time the high development values disclosed in the mines of the Orange Free State, Klerksdorp, and the Far West Rand, have, in the main, exceeded original estimates which have done much to justify the large scale capital investments already made and point the way towards a more prosperous future and, given stable political conditions, a continuing expansion in the output of gold and the profitability therefrom may be expected.

#### Steel Production at Record Levels

Although precise figures will not be known until next week, it is now definite that steel output over the first half of this year has exceeded 9,500,000 tons which is 5 per cent more than in the same period of last year. Nevertheless, we are importing very considerable tonnages of foreign pig iron and these are expected to continue until the new blast furnaces at Appleby-Frodingham and Bilston come into operation later in the year.

This increase in production has been almost exclusively sustained by a rising home demand. Exports have not appreciably increased although sales to Australia have been very brisk during the past few weeks. On the other hand steel imports have been severely reduced and the Federation puts the rise in home consumption at 8 per cent from 7,930,000 to 8,600,000 tons.

Shortages of particular products have been overcome and delivery periods much improved. The demand for plates can now be met from home sources. There has been a marked increase in the flow of orders for light rolled products in which strip has figured prominently. The demand for sheet steel has been given a big impetus by the expansion of output in the motor trades and the increased call for heavy rolled steel products is well maintained. Summarizing the position the British Iron and Steel Federation states in its latest Bulletin, that "for the majority of products the orders now on the books will ensure the maintenance of production at a high level in the immediate future, while new orders are showing a rising tendency." Their conclusion is that "provided there is no further deterioration in the American business position, a high rate of activity in the steel industry would seem to be assured."

## Brazil

(From Our Own Correspondent)

Teresopolis, July 4.

Sterling is again available in Brazil, although in small amounts, and modest orders for British goods will be reaching U.K. in July. The first two auctions were held on June 14 and 24 (see *The Mining Journal*, May 14, 1954), and others should follow at short intervals. At each sale £300,000 were offered and promptly taken up. Premiums were high, owing to keen competition, but not surprisingly so for first auctions. British exporters should keep their Brazilian representatives supplied with up-to-date f.o.b. prices, percentages to be added for c.i.f. values, net weights and delivery times, as these particulars must appear in applications for import licences.

#### MINERAL RESEARCH IN 1954

Aerial surveys in north-east Brazil, over two areas of 40,000 sq. kilometres, have revealed occurrences of uranium, thorium and tungsten, which are now being examined by the Department of Mineral Production, in Paraiba, Rio Grande do Norte and Ceara. These states contain important deposits of beryllium, columbite, tin, mica, quartz, tantalite and scheelite. Interest in the mines revived in 1951 and output increased 4.5 times in volume and value in that year. New scheelite deposits were then opened at Caraubas and yielded 195 tonnes, while the output of the Currais Novas mines doubled.

June shipping lists for Joao Pessoa show the diversity of mining activities in this region. They include columbite, tungsten, fluorite, amianthus, barite, tantalite, scheelite, bismuth and amblygonite. The quantities shipped are small and range from 1 tonne of columbite to 25 of tungsten, 42 of fluorite, 50 of scheelite and 51 of barite.

The Commission for Economic Development of the Amazon Basin is studying a project to employ aerial prospecting in the Amapa Territory. The region to be prospected extends from Vila Nova, on the River Cajury, to the banks of the Oiapoque. It is of difficult access from the ground and practically unexplored, but is reliably reported to contain deposits of cassiterite, ilmenite, tantalite, chromite, manganese, bauxite and atomic minerals. An American firm of mining engineers has opened an office at Macapa and will prospect along the Amapari River, prior to applying for mining licences.

Valuable haematite beds, with 63-69 per cent Fe, have been located near Vila Nova and members of the U.S. Geological Survey, who have been examining the Amapa manganese beds, report that these are the richest known in the Western Hemisphere, with estimated reserves of 20,000,000 tons. The ore lies near the surface and has an average Mn content of 48 per cent. The port and railroad, now under construction, should be completed within three years, permitting large-scale exports.

Aerial surveys are also being carried out in South Brazil, along the Ribeiro Valley between Sao Paulo and Parana, to locate non-ferrous metals. In the same region the Department of Mineral Production is studying deposits of copper, zinc, tin and lead and will extend its activities to Januaria, in Minas Geraes, where zinc and lead are known to occur. The Department, which has received a special grant of £2,400,000, will continue the search for uranium minerals this year, examine the zirconium and bauxite deposits of Poços de Caldas and the coal seams of Parana, Maranhão and Piauí. American and Brazilian geologists are mapping out an area of 434 sq. miles in Central Minas Geraes, the cost to be shared by the U.S.A. and Brazilian governments.



# Australia

(From Our Own Correspondent)

Melbourne, June 30.

Western Australia shows a steady increase in gold production, the total for the four months to the end of April being 296,714 f.oz., compared with 282,774 f.oz. for the corresponding four months of 1953. The total for that year was 818,516 oz. and for 1952, 720,366 oz. The loss of gold from the closing down of Wiluna Gold Mines is being compensated to some extent by Great Western Consolidated, and there is increased production by Central Norseman Gold Corporation and several of the mines on the Kalgoorlie field. There has been an increase in the price of gold of 2s. 8d. per oz. which will add about £A110,000 to the total value of the State's output. The largest producing mines, in terms of ore, are Lake View and Star Ltd., with 657,621 tons for 1953, Great Boulder Pty. Gold Mines Ltd., 409,814 tons, Big Bell Mines Ltd., 402,906 tons, and Great Western Consolidated N.L., 392,508 tons. Two companies exceeded 100,000 oz. of gold in 1953, Lake View and Star, 165,691 f.oz., and Great Boulder, with 106,775 f.oz. Total production for 1953 was 3,169,875 tons of ore for 823,331 f.oz.

The price of gold continues to be the restricting factor to new enterprises, but there is interest in prospecting to a limited extent. A find is reported 11 miles south of Southern Cross, with values stated to be up to 8 oz. gold per ton. About 200 acres have already been pegged out.

## THE SEARCH FOR URANIUM

Search for uranium in Australia shares the leading position in the mining world with oil. At the moment the most important centres of interest are the Northern Territory, Radium Hill in South Australia, and Mount Isa in North Queensland. The big mine in the Northern Territory is Rum Jungle, which is being operated for the Commonwealth Government by Territory Enterprises Ltd., a subsidiary of Zinc Corporation Ltd. The treatment plant here is nearing completion, and will be officially opened by Mr. R. G. Menzies, Prime Minister of Australia, on August 31. The method of mining to be adopted is open cut, the selection being governed largely by the width of the occurrence, and the difficulties that would arise in underground operations in the very soft, heavy ground.

A number of companies are operating in the Territory but most seem to be prospecting where secondary minerals have been located. A company working at Brock's Creek has reported that a parcel of ore is ready for consignment to the treatment plant at Rum Jungle; the Rio Tinto company held options from this company, but has now abandoned them; it is not clear whether primary ore has been located in the Brock's Creek workings. So far, other companies have not reported the winning of commercial ore. The South Australian Government's mine at Radium Hill is reported as likely to commence production in August. The ore is davidite, and a concentrate will be made at the mine and consigned to the treatment plant at Port Pirie. The ore in sight is stated as not being high grade, but tonnage is sufficient to keep the field and the Port Pirie works in operation for a number of years. Diamond drilling has shown persistence of the uranium lode to a depth of 1,500 ft. The main shaft has been sunk to a depth of 700 ft. and preparatory work is well advanced.

Much exploratory work has been done to the north of Radium Hill, the first find being made at Crocker's Well about 20 miles out, where appearances point to an occurrence of importance; exploration has been extended to about 80 miles north, covering an area of 500 sq. miles of country showing radio-activity, on which surveys and

diamond drilling are in progress. The ore over a wide area is similar to that at Radium Hill.

At Mount Isa, Queensland, activity extends for some 60 miles north of the Mount Isa township. Mount Isa Mines Ltd. is prominent in the search and holds a number of leases. The company has been carrying out aerial geophysical work, as well as ground work. Two other strong companies in the field are Northern Uranium Development and Australasian Oil Exploration Ltd. The latter has a large geological staff at work on leases totalling 1,100 acres, and costeaning and stripping have been in progress. On one area an occurrence has been defined for a length of 120 ft. and a width of 57 ft. This occurrence is being sampled and prospected for extensions. So far, sampling and assaying have shown an average grade of .8 per cent uranium oxide over a width of 57 ft. With the proving of orebodies of importance, the question of treatment becomes prominent. So far, Rum Jungle is the only plant capable of dealing with customs ore. The Radium Hill plant appears to be more suitable for treating ore of its own particular type, and then for production of concentrate only. Heavy media separation will be used, followed by flotation.

The Port Pirie treatment plant is yet some way off completion, and it is stated that a simple method of treatment has been evolved which will make a very substantial saving in capital and operating costs. Radio-active discoveries in Western Australia do not seem to be of particular importance. Recent indications in Victoria are described, after examination, as unimportant. A find, claimed to have potential importance, has been made in the Clarence River country in New South Wales, but details are lacking.

## OIL IN AUSTRALIA AND NEW GUINEA

The centres of interest in oil search are still the operations of West Australian Petroleum Pty. Ltd. at Exmouth Gulf, and Associated Australian Oil Fields N.L. in Australia, and the joint operations of Australasian Petroleum Co. Pty. Ltd., Island Exploration Co. Pty. Ltd. and Oil Search Ltd. in New Guinea.

West Australian Petroleum, after the discovery of an oil sand which tested at the rate of 20 bbl. per hr. at a depth of 3,600 ft., has continued the No. 1 Rough Range bore, and showings of oil have been obtained below 9,700 ft. (It will be recalled that in our issue of July 2, 1954, it was pointed out in "Notes and Comments" that at time of writing the No. 1 Rough Range bore had reached a depth of 9,226 ft. with no change of significance following the 3,600 ft. location.) Three attempts to test the formation at this depth have been unsuccessful, due to trouble with the packer, and a further test is to be made. The company is preparing to drill on the closely adjacent Cape Range.

On the Roma, Queensland, field, Associated Australian Oil Fields have struck a heavy flow of gas in the No. 4 bore, the make being at the rate of 1,500,000 cu. ft. per 24 hrs., at a pressure of 900 lb. per sq. in. Depth is about 3,770 ft.

Operations by the three mentioned companies in New Guinea were interrupted by the sticking of the drill pipe at a depth of 13,743 ft., after meeting a heavy flow of gas, in very heavy, swelling ground. Fishing with specially imported equipment having failed, the obstruction was bypassed at a depth of 11,678 ft. and drilling has now reached a depth of 12,353 ft. Strong hopes are being based on this bore—Omati No. 1—because of the very high gas pressure. The company's Omati No. 2 bore is nearing 4,000 ft.

Amongst strong companies well forward in preparatory work are Australasian Oil Exploration Ltd., which will commence drilling at Reid's Dome, Queensland, in August, and in the Fitzroy Basin, Western Australia, Associated Frenay Oil Fields is preparing to assemble drilling equipment.

## Diamonds in the Rand Mines

The output of diamonds as a by-product of the Witwatersrand gold mining industry is not widely known, notwithstanding the fact that the yield can run into several hundreds of carats a year. The following article, which is of general rather than technical or economic interest, briefly describes the Witwatersrand diamonds and indicates that their peculiarities might have been a pointer to the presence of uranium.

If the tiny diamonds that inevitably must be lost in the treatment processes used in the Witwatersrand could be recovered the total output would be larger. Diamonds found on the Rand have usually been small. In the £100,000 or so of diamonds recovered since the fields were opened there none has been larger than eight carats. Most of the stones have been very much smaller, rarely exceeding two carats. Some have also been filled with flaws or otherwise of poor quality, but on the whole these diamonds have had gem value.

### EARLY INTEREST IN COLOUR

All the diamonds from the gold mines have had a greenish colour. In 1924, when addressing the Geological Society of South Africa, Professor J. G. Lawn dwelt at some length on this aspect of these gems. He mentioned that the discovery of these diamonds in the gold mines had, in the first place, upset several previously accepted ideas about the origin of diamonds. He said that "there must have been diamond-bearing rocks of very much greater age than these pipes because diamonds have been found in gold-bearing conglomerates of the Witwatersrand system, and the conglomerates represent the debris of still older formations, which must have included diamond-bearing rocks."

Later in his address he raised the question of whether diamonds discovered in the blanket have a more or less greenish hue, on which he remarked that "Sir William Crookes has shown that white diamonds are turned green, and green diamonds red by the action of radium rays. Now that Mr. R. A. Cooper has definitely proved that there is radium in the blanket, both the prevailing colour and the exceptional colour may be explained. Probably they are not the colours of the diamonds when they were originally deposited. At any rate it is clear that there are diamonds of at least two geological ages, one very ancient and the other much newer, and it may be that there are diamonds of other ages also."

The reference to exceptional colour was to a pink diamond found in the gold mines. Such a stone turned up in the Kleinfontein Mine. Long before the presence of radium in the geology of the Rand mines was proved, Dr. Percy L. Wagner propounded a theory later shown to be correct. All this is of interest in regard to the prominence uranium is now playing in the economy of the South African gold mining industry.

Geologists and mining engineers did not neglect the study of the Rand diamonds, which have been the subject of much research. Work along these lines has been done by Professor Young, who commented on the colour of the stones: "It is noteworthy that the colour, when recovered, of many diamonds, stated to have come from the blanket, has invariably been green. This should be sufficient to dispose of doubts that might arise as to the genuineness of any such find." Regarding the sources of such gems, he said: "It may be considered as certain that the diamonds in the blanket were deposited with the pebbles during sedimentation and the occurrence is interesting as proving that there exists a source of diamonds in the Swaziland system from which the blanket was derived."

Another authority pointed out that the material forming the dwyka came from the north and so did the conglomerate

beds of the Rand. He then questioned whether it was possible that certain river stones and those in the blanket came from the same source. According to Professor Young, only once has a diamond been found *in situ* in the blanket, all the other diamonds of the Rand being removed from the black sands in battery mortar-boxes.

The first reports of diamonds in the Rand mining fields were received sceptically. The blanket was not then regarded as geologically suitable for such gems, and the reports of the first two diamonds were dismissed as concerning freak finds of little importance. That view was not held for very long. Soon other diamonds were dug up in the mortar-boxes. These new finds were made in the East Rand mainly and at Klerksdorp, where the gems occurred in the Elsburg geological series.

Probably the actual number of diamonds recovered in the gold mines far exceeds the total indicated by available statistics, as, especially in the early days, few records were kept either by the mining companies or the Government officials. None the less, sufficient evidence is available to establish that the total has been considerable.

Officially it has been stated that diamonds occur in conglomerates from which gold is being produced on the Rand and are won along with osmiridium on the corduroy tables. They are present in minute quantities relative to gold. From most mines no stones have been produced and in other places only one or two have been found. Most of the diamonds have come from the Modder B mine, where in one year 194 carats were produced. The distribution of diamonds over the Reef area appears to be related to that of osmiridium, another minute constituent of the reef.

### DEPOSITION IN REEF

The discovery of diamonds in sedimentary beds such as those of the gold mining areas has been accepted as indicating that they are of much greater age than the volcanic "Kimberlite" pipes and fissures, indicating that there must have been some very old and as yet undiscovered primary source of the diamond. Thus Mr. Alpheus F. Williams pointed out that "there are deposits which are known to be older than the Kimberlite formations; for example, the Witwatersrand beds, which are probably of pre-Cambrian age, have been found to carry a few diamonds. In the crushing of blanket rock in some of the mines of the Witwatersrand diamonds have been liberated and were eventually recovered in the mortar-boxes." According to the description given by this famous authority on diamonds in South Africa, the Rand gems were generally "small, but all have the clear, alluvial appearance, in that many of the edges and faces are water-worn. The colour of the diamonds ranges from cadmium-yellow to yellow-green and dark-green. Many of the stones appear black, due to surface coating, which results in a coloured lustre, like that of oxidized steel. It has been suggested that the yellow-green colour has been produced by the diamonds coming into contact with radio-active minerals."

While these diamonds may represent a potential source of income to mining companies, it has generally proved difficult to arrange the processes of extracting gold from the ore so that any diamonds present may not be destroyed.

# The Principles of Koepe Winding

By A. GRIERSON, B.Sc., A.M.I.Min.E.

Although the Koepe winder has hitherto been more traditionally associated with the coal mining industry, particularly in the Ruhr, the realization that a more widespread application is possible has followed its installation at metalliferous mines in Sweden and on the Witwatersrand. Indeed, a consideration of those mining properties at present using Koepe winders, whether ground or tower, shows plainly that the system can be effective in carboniferous or metalliferous mines of either deep or shallow hoist level. The following article describes the basic principles of Koepe winding and presents interesting formulae on the application of the system.

In the essentials the Koepe winder consists of a grooved driving sheave on which the rope is in contact for approximately half the circumference. This simple form of hoist was described by Lemielle in Belgium in 1862 but it was not until 1877 that the first Koepe installation came into being. In this year Carl Friedrich Koepe installed a hoisting plant at Hanover Colliery in the Ruhr and it is a tribute to his pioneering spirit that this system of sheave winding bears his name.

An indication of the popularity of the Koepe system is afforded by the fact that no less than 90 per cent of the shafts in Germany and Holland are so equipped. A possible reason for the slow progress Koepe winding has made in Britain is the relatively shallow depths—average 1,200 ft.—at which the coal is mined. Since nationalization Koepe winding has been considered as an alternative to drum winding at several major projects and the new Rothes Colliery in Scotland is designed for cage winding with Koepe pulleys from a final depth of almost 4,000 ft. Two new anthracite mines in Wales are also to be equipped with Koepe winders.

## WINDER DESIGN

Basically there are two designs; the Ground Koepe and the Tower Koepe. The ground Koepe can be installed either:

- (a) with the head gear pulleys on the same level and parallel to each other. This necessitates the rope diverting from the centre line of the Koepe pulley on the ground; the resultant fleet angle being kept below 1.5 deg.;
- (b) with the head gear pulleys situated one above the other in direct line with the Koepe pulley. The rope contact is of the order of 190 deg. and fleet angle is eliminated.

The two systems are distinguished by designating them ground Koepe with or without fleet angle.

The tower or turret Koepe winder has certain advantages over the ground type these being:

- (a) more compact in that all the winding equipment is housed together;

- (b) complete enclosure;
- (c) greater stability in that all loads are vertically downwards;
- (d) head gear pulleys not needed;
- (e) a larger angle of rope contact can be obtained, normally 200-220 deg.;
- (f) slightly less rope required;
- (g) elimination of rope lash and fleet angle;
- (h) better suited for multi-rope Koepe systems where large loads are involved.

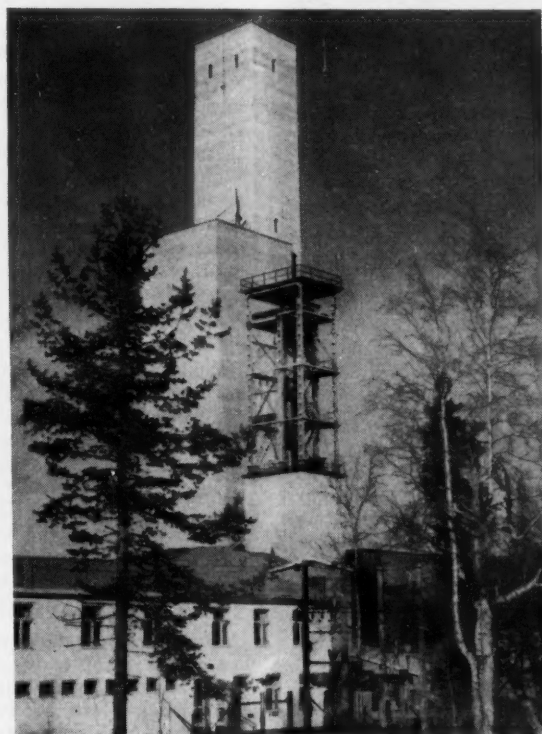
Despite these advantages many Continental engineers have a preference for ground Koepe winders and maintain that the tower type should be confined to those installations where lack of space near the shaft precludes adoption of some form of ground Koepe system. One of the chief reasons for this decision is the fact that under normal conditions ground Koepe winders are less expensive than the tower type.

The principal limitation of any form of Koepe winder is that they are essentially single level hoists and if winding is to be carried out from many levels the double clutched drum winder is preferable. However, in many instances where multi-level winding is practised two Koepe winders are installed in one shaft. Being a single level winder the Koepe system is eminently suitable for horizon mining.

Broadly speaking there are two types of driving wheel, the choice being governed by the method of rope changing to be adopted. In the rope magazine type of driving sheave the construction is such that the whole length of rope can be temporarily accommodated on the wheel, this greatly facilitating installation. With the normal type of Koepe wheel a special winch is needed to install the rope. This winch will, of course, add considerably to the cost of the winder but can be used communally by a group of winders and so the expense can be distributed.

Koepe driving wheels are usually constructed as follows:

- (a) cast steel;
- (b) cast steel or cast iron hub with steel arms and rim of riveted construction;



Tower Koepe winder at Laisvall lead mine, North Sweden



- (c) cast steel hub with channel steel arms and rim of welded construction.

In Europe the usual minimum size of driving wheel is not less than 100 times the diameter of the rope, the normal range being 16 ft.-30 ft. dia. The Koepe sheave is lined with hard wearing inserts designed to hold the rope and prevent slip. Common linings are elm or beech blocks, aluminium alloy blocks, laminated fibrous materials such as Ferodo, Balata, leather, etc., and various combinations of fibrous materials and wood. The coefficient of friction between the rope and the lining varies with the material used, average values being as indicated:

Lining	Static Coefficient	Dynamic Coefficient
Aluminium Alloy	0.50	0.23
Leather	0.45	0.22
Ferodo	0.45	0.22
Wood blocks	0.35	0.20

It will be observed that once relative motion between the lining and the rope takes place the coefficient of friction is greatly reduced and in designing an installation it is usual to use the value of .2 as being the coefficient of friction, this representing the worst conditions and taking into account normal acceleration and retardation effects. It is of course essential that the designed loads, acceleration and retardation are not exceeded and also to ensure that the linings and ropes are kept free from moisture and grease. This latter provision somewhat restricts the lubrication of the winding rope but there are in existence light oils and compounds to protect Koepe ropes against corrosion.

The pressure between the tread on the Koepe wheel and the winding rope is usually arranged to be between 180 lb.-250 lb. per sq. in. it being found that excessive pressures accentuate rope and tread wear. The pressure is given by the equation  $\frac{P=W}{D \times d}$

where P=rope pressure in lb./sq. in.  
W=total suspended load on both ropes in lb.  
D=diameter of sheave in inches  
d=diameter of rope in inches

The rate of tread wear is dependent upon many factors, principally: tread material, type of rope, revolutions of driving wheel and tread pressure. Widely differing operating conditions militate against a definite relationship between tread wear and these various factors but it is considered that tread wear is mostly dependent upon tread pressure and number of revolutions of driving sheave. As both of these factors increase with decrease in Koepe sheave diameter it is axiomatic that this should be as large as practicable. The life of the tread is frequently of several years duration.

### ROPE SLIP

The incoming and outgoing rope tensions in a Koepe system are connected by the simple Weisbach formula

$\frac{T_1}{T_2} = e^{\mu\theta}$ , and thus slipping of the rope will not occur so long as  $T_2 (e^{\mu\theta} - 1)$  exceeds  $(T_1 - T_2)$ .

where  $T_1$  and  $T_2$  = the greater and lesser tensions respectively

$e$  = base of natural logarithms (2.718)  
 $\mu$  = coefficient of friction between driving sheave and rope (usually taken as 0.2)  
 $\theta$  = angle of rope contact in radians

To calculate values of  $T_1$  and  $T_2$  the following formulae are used:

Tower Koepe with loaded cage on driving sheave side:

$$T_1 = (WF + F) + \frac{f}{g} WF$$

$$T_2 = (WE - F) - \frac{f}{g} (WE + S)$$

Tower Koepe with loaded cage on deflecting sheave side:

$$T_1 = (WF + F) + \frac{f}{g} (WF + S)$$

$$T_2 = (WE - F) - \frac{f}{g} WE$$

Ground Koepe:

$$T_1 = (WF + F) + \frac{f}{g} (WF + S + K)$$

$$T_2 = (WE - F) - \frac{f}{g} (WE + S + K)$$

where  $T_1$  = tension in ascending rope  
 $T_2$  = tension in descending rope

WF is weight of conveyance, load and rope on the ascending side;

WE is weight of conveyance and rope on the descending side;

$f$  is the acceleration in ft. per sec. per sec.;

$g$  is the gravitational constant;

$S$  is the effective weight on the rope of the guide sheave;

$F$  is the effect of shaft friction. This varies with type of shaft guides and shoes but is normally taken as being 0.3 tons;

$K$  is the weight of the rope between head pulleys and ground Koepe sheave.

The provision of a tail or balance rope—usually flat—increases the amount by which  $T^2 (e^{\mu\theta} - 1)$  exceeds  $(T^1 - T^2)$  and further prevents the possibility of slip on the Koepe sheave and in addition reduces the peak h.p. requirements. With a tail rope the greater the shaft depth the less will be the risk of rope slip as the less effective is the out of balance load. Koepe winders in deep shafts are always equipped with balance ropes and in some instances twin tail ropes have been used.

### KOEPE WINDING AT SHALLOW DEPTHS

Whilst admirably suited for deep shafts Koepe winding has been used successfully at mines of comparatively shallow depths. Notable examples of such installations are to be found in Sweden where many metal mines use this system of hoisting. Examples springing to mind are Grangesberg and Laisvall. With shallow shafts the provision of a tail rope can sometimes be dispensed with, by using very heavy skips and relatively light ore loads. This has the desired effect of reducing the  $T_1 : T_2$  tension ratio below the safe figure as determined by consideration of rope lap and coefficient of rope friction.

Excessive slip on a Koepe sheave under normal conditions is rare but in order to guard against its occurrence the acceleration and retardation is limited to a maximum of 3-4 ft./sec.<sup>2</sup> Tests on various Koepe installations have shown that even severe braking when the conveyances are travelling at full speed has failed to induce slip. Instances of slip being experienced with ground Koepe winders have been recorded—due to the presence of hoar frost on the rope. To overcome this difficulty some engines are fitted with nozzles which spray steam on the ropes and treads for the first wind after a prolonged stand.

Rope creep is experienced with every Koepe winder and is caused by the difference in rope tension between the incoming and outgoing sides of the driving sheave. It is the elastic change in rope length and is greater with increase in the  $T_1 : T_2$  tension ratio. Considering an empty cage or skip being lowered down the shaft to the loading level: on receipt of its load at this level the rope will stretch proportionately to the added weight. Thus a greater length of rope needs to pass back over the sheave than passed down over it. Normally this creep is cancelled out after completion of a whole winding cycle but on occasion creep may be pronounced in one direction. This cumulative creep may be



due to excessive guide friction on one conveyance or alternatively one conveyance may be heavier than the other. Uneven loading on one particular side may also induce creep but the possibility of excessive loading being confined to one side only is remote. Such cumulative creep renders inaccurate the depth indicator and protective devices driven by gearing from the Koepe shaft and so it is necessary to make periodic adjustments. For this purpose a vernier coupling is introduced between the Koepe pulley and the depth indicator. This vernier coupling enables quick adjustment to be made and this may be done once or twice per shift. With Koepe winding it is impracticable to mark the sheave to facilitate decking as is customary with drum winding; instead the rope itself is marked.

### MULTI-ROPE KOEPE WINDING

The first multi-rope Koepe winding plant was completed in 1947 at Hanover in Germany which as previously mentioned was also the birth place of the single rope system. As this mine was planned to hoist 12 tons useful load per wind from a depth of 4,600 ft. at a maximum speed of 3,540 ft. per min. the problem confronting the engineers was largely one of designing a suitable rope for this heavy duty. Calculations showed that if a single rope was to be used it would require to be 3.74 in. in dia. Such a large rope presents manufacturing difficulties and experience with other large ropes had shown their tendency to twist. Furthermore large ropes require larger pulleys and heavier equipment and are also more difficult to examine. The alternatives to using such a large rope were either to wind in two stages or to introduce the multi-rope system.

The latter remedy was decided upon and accordingly a four rope Koepe winder was designed. Four ropes each of 1.75 in. dia. were specified and initially it was thought that without the use of compensating devices trouble would be experienced due to uneven tension distribution among the ropes. Accordingly load equalizing devices were fitted between the cages and the ropes. These incorporated sliding sheaves designed to take up any variation due to uneven rope stretch or slight differences in pulley diameter. This load equalizing equipment was heavy and added considerably to the dead weight of the cages but it was decided that this increase in weight could be offset by removing the safety catches, it being felt that in view of the enhanced safety consequent to the use of four ropes the catches were unnecessary.

### EQUALITY OF LOADING

After practical experience had been gained it was found that it was possible to wind satisfactorily without the use of these compensators and these were subsequently blocked and rendered ineffective. One thing, however, is necessary, this being the provision of fitted dynamometers for visible measurement of rope forces. Should unequal loading develop this can be remedied manually by means of adjusting pieces in the intermediate rope gear. With four rope Koepe winding it is possible to neutralize the effect of rope twist on the guides by arranging the ropes in pairs, two having left hand lay and two having right hand lay. In Germany stranded rope is favoured for winders but in France and Britain the trend is towards locked coil. Individual considerations largely govern choice of rope—the life of these being of the order of two years.

One of the criticisms sometimes levelled at Koepe winding is that greater landing precision is required than with drum winding and consequently increased decking time may be needed. Provision of swinging platforms at shaft top and bottom facilitate decking and allow a little latitude in

decking precision. Concerning skip winding, although there is no record of an overturning skip being used with a Koepe winder, certain shafts in South Africa have operated satisfactorily with overturning skips hoisted by a Whiting drive. Bottom emptying skips are used extensively on the Continent and the Koepe system is giving every satisfaction.

The simple mechanical arrangements of the Koepe system makes for a saving in power, the inertia of the Koepe pulley being considerably less than that of a comparable drum winder. The appended table is indicative of the saving in h.p. and shows the calculated values for A.C. winders designed to raise 450 tons per hour a distance of 3,000 ft. using 12 ton capacity skips.

Type of Winder	Diameter	Inertia of drum and gear wheels	R.M.S. motor h.p.
Cylindrical drum without tail rope ...	24 ft.	750,000 lb. ft. <sup>2</sup>	5,410
Cylindrical drum with tail rope ...	24 ft.	750,000 lb. ft. <sup>2</sup>	3,800
Bi-cylindrical conical drum ...	18-35 ft.	2,530,000 lb. ft. <sup>2</sup>	4,350
Koepe pulley ...	24 ft.	154,000 lb. ft. <sup>2</sup>	3,260

Koepe winding experience has led to the conclusion that the need for recapping winding ropes is not so acute as with drum winding in that the high reactive kinetic starting forces and torsional stresses at the neck of the capel are not so severe, due to the conveyance being constantly suspended on the rope. It is normal practice to dispense with keps when using the Koepe system it being felt that the use of keps is unnecessary. Some installations, however, are equipped with them. If recapping becomes necessary due to stretch or other reason adjustment of rope length can be effected by means of links interposed between the capel and the conveyance.

### CURRENT INSTALLATIONS

Due consideration of the pros and cons of Koepe winding has been given regarding the hoisting equipment for the West Driefontein Gold Mining Co. Ltd., and has resulted in the placing of an order from New Consolidated Gold Fields Ltd. for a four rope tower Koepe winder which when installed will be one of the largest of its kind. This winder is designed for a skip load of 14 s.tons, with a lift of 5,460 ft.

The order for the winder has been received by Fraser and Chalmers Engineering Works of the General Electric Co. Ltd. The mechanical parts, with the exception of the reduction gears and certain specialized items will be constructed in South Africa by the East Rand Engineering Co. Ltd., from drawing and design data provided by G.E.C. Two 2,000 h.p. Ward Leonard controlled 500 r.p.m. motors will be used to drive the Koepe drum through reduction gears. The motors are to be built at the Witton Works of the G.E.C. A notable feature is that the winder is arranged for push button control although normal winding engine drivers' controls are also provided. The Koepe drum carrying the four ropes will be 17 ft. 6 in. in dia. and the total suspended load on the 26 in. dia. bearings will be approximately 120 tons. The maximum rope speed is designed at 3,000 ft. per min. and the total winding cycle will be 136 sec. The total value of the contract is of the order of £130,000.

Several other mines throughout the world are to be equipped with Koepe winders and indeed if long winds from few levels are contemplated this system of hoisting can be used with advantage. Swedish practice, however, has shown that Koepe winders also operate successfully at shallow depths and the 12 new shafts to be sunk at Kiruna in Swedish Lapland will use Koepe winders.

## DRILLING MUD—II

# Control and Testing of Water Base Drilling Mud

In our issue of July 2, 1954, the initial instalment of this article pointed out the importance of the drilling fluid system to the rotary oil drilling rig and discussed the functions and structure of drilling fluid. In the final portion of the article which appears below, practical usage of drilling mud fluids is described, as are the field tests which have now become routine and standardized. The article is a condensation of a paper presented at a drilling symposium which was held at the University of Minnesota, United States, during October of last year, by W. D. Lacabanne, assistant professor of petroleum engineering at the University. The paper was presented in the hope that some of the features of drilling fluids would be regarded as being of use in diamond drilling operations.

The drilling bit frequently encounters formations containing waters which enter the drill hole and cause difficulties in drilling. Proper weight control of the drilling fluid often controls the invading waters.

The fluid pressure gradient for fresh water is .433 p.s.i. per ft. of depth (or 43.3 p.s.i. per 100 ft. of depth) and for sandy and porous formations of 500 to 1,000 ft. of depth the ground water pressure gradient is probably close to the .433 p.s.i. per ft. value. When water is used as the drilling fluid the hydrostatic gradient in the drill hole is also .433 p.s.i. per ft. of depth and the hydrostatic head produced by this gradient would exactly equal and counterbalance the hydrostatic head of the formation water at all depths under discussion. But during the course of drilling, as drill cuttings, clay, and other fine particle material are gradually picked up by the drilling fluid, the drilling water becomes loaded to form a mud fluid of greater mud weight and consequently makes a mud column of greater hydrostatic head, which then is greater than the formation water pressures at any given depth. Thus ground waters are prevented from entering the drill hole.

Fresh water weighs 62.4 lb. per cu. ft. (or 8.34 lb. per gallon) but with the addition of drill hole solids and clay may easily increase to as much as 70 lb. per cu. ft. (or 9.35 p.p.g.) so that the pressure gradient of the fluid column in the drill hole will increase from the fresh water value of .433 p.s.i. per ft. to .486 p.s.i. per ft. At a depth of 500 ft. the pressure differential between the mud column and the formation would amount to 26.5 lb.; at a depth of 1,000 ft., 53 lb.; and at 100 ft., 5.3 lb. If the given mud weights used do not control the formation waters either more clay material or high specific gravity weighting materials may be added to the mud fluid to increase its density. The increased mud weight also helps support the walls of the hole. The drill hole should always be kept full of drilling fluid to achieve and maintain the downhole pressures. A quick and easy method of increasing the downhole pressure which will control invading formation waters is to increase the circulating mud fluid pressure. When the mud fluid flows down through the rods most of the mud pressure is used up in overcoming pipe and annular space friction but some pressure is left over which becomes added to the pressure of the mud column. The proper viscosity and gelation properties of the mud fluid should be maintained while controlling invading waters.

## LOSS OF FLUID TO FORMATIONS

Lost circulation, or the loss of mud fluids, partial or complete, to porous or fissured formations, is frequently encountered in drilling and certain methods to combat lost circulation have evolved. The more effective methods are: reduce mud weight and/or mud pump pressure; increase mud viscosity and gel strength; use of sealing agents; cement—for extreme conditions.

In a 500 ft. hole filled with a 70 lb. per cu. ft. mud (9.35 p.p.g.) the previous example has shown that a 26.5 lb.

differential may exist between the hydrostatic head of the drilling fluid and the normal formation pressure. While this hole-favoured differential will prevent formation waters from flowing into the drill hole the reverse may take place and the pressure differential may be the cause of loss of mud fluid to the formation, if the formation is porous, fissured, cracked, or cavernous. Sands and gravelly formations and cracks having openings of .1 mm. to 1 mm. can cause loss of mud returns.

Loss of mud to the formation may be prevented by reducing the pressure differential in the hole and the pressure differential is lowered by reducing the hydrostatic head of the mud column. A quick reduction in some hydrostatic head may be obtained by reducing the mud circulation rate, i.e., slowing down the pumps. However, the slower mud velocities up the drill hole may be insufficient to lift the drill cuttings or remove them fast enough. The viscosity and gelation of the mud may then need to be increased. Another method of reducing head in the hole is the dilution of mud with water which reduces mud weight.

## MUD FLUIDS AND DRILLING OPERATIONS

Wall sealing agents may be added to the drilling fluid to plug the openings in the "thief" sands. If the formation openings are larger than the sealing fragments, the fragments pass into the opening, channel, or fissure and flow until they are stopped by openings smaller than themselves. If flow continues, though reduced, sealing fragments continue to pile up until the opening is plugged, when mud flow into the formation ceases. Sealing agents are widely used because of their ease of application and the startling results that are sometimes obtained. For ordinary pore openings thin film plastering agents of cellulose flakes, mica, graded fibres of wood and sugar cane are used and are easily handled by the mud pumps.

If the formation openings are abnormally large and the thin plastering sealing agents are ineffective in stopping the mud loss, bulk sealing agents consisting of large fragments are used. If the pumps can handle hay, it may be used, or sawdust, or even manure. Perhaps the most widely used bulk material is cottonseed hulls which is a cheap material used in refractory sealing operations. The trouble with bulk sealing agents, however, where the wall surface pore openings are smaller than the sealing fragments, is that the sealing agent tends to build up mud cakes of poor plastering and filtration properties which may interfere with drill rod operation.

When pulling drill rods the mud level in the drill hole is lowered and as a consequence, the hydrostatic head is reduced. If the mud column is critically balanced to control formation pressures and to support the walls of the hole the lowering of the mud level in the hole may allow formation pressures to exceed mud column pressures. To counteract possible trouble, mud should be pumped into the hole and should be kept full while rods are being pulled. Pulling of "wet strings" aggravates this problem.

When running rods into a hole filled with mud in critical

hydrostatic balance, pressure-surges which may break down formation pressures can be created in the mud column by fast running of rods. A pressure-surge is created like a hydraulic ram when the rods push down the hole into a viscous mud which does not readily move up into the annular space. Similar pressure-surges may be created when the rods in the hole are spudded up and down rapidly while the pumps are running or by starting the pumps suddenly which throw on full pump pressure to the gelled, high inertia, mud.

When pulling drill rods a swabbing action, which may seriously lower the hole pressures enough to initiate water invasion, may take place in the hole. In small diameter holes swabbing effects are particularly large because of the small clearance between the rods and the hole and the effective sealing action of the mud in the annular space.

### FIELD TESTING

The testing of drilling fluids in the field is now routine and standardized tests have become established. The American Petroleum Institute has set up recommended standard field procedures for testing drilling fluids and the outline and details of these tests can be found not only in the A.P.I. Standards but also in the excellently illustrated supply company literature.

One set of field tests, on density, viscosity, gel strength, filtration, and sand content, tests the physical properties of the mud fluid while the other set, on salt concentration, water hardness, pH, among others, tests the chemical properties.

**Density Test:** Density or mud weight may be measured by several instruments, either a balance-type or a hydrometer type. Both are simple in construction and simple to use for only a cupful of mud fluid is required to fill the instrument cup. On the balance type the mud cup is part of the graduated beam arm and a sliding weight permits balancing the beam on its knife-edge. The mud weight may be read from the beam directly, either in lb. per gallon or lb. per cu. ft. The hydrometer type made of aluminium is immersed in clean, fresh water. A removable plastic cup when filled with mud is replaced on the bottom of the hydrometer stem, the hydrometer immersed in water in its own container, and the mud weight read directly at the water line from the graduated stem in any one of three units, specific gravity, lb. per gallon and lb. per cu. ft. Also a fourth scale gives the pressure head directly in p.s.i. per ft. of depth.

**Viscosity Test:** Viscosity of mud fluid may be measured either by the simple Marsh funnel method or the more precise, laboratory type, Stormer Viscosimeter method. The Marsh funnel is 12 in. long, 6 in. in dia. at the top and pinches down to a 3—6 in. dia. opening at the bottom. The common test is to place 1,500 c.c. of mud in the funnel—the level of this volume just reaches a built-in screen—and time the efflux of one quart of mud. The elapsed time in sec. is the Marsh viscosity and for average oilfield muds may vary from 30 to 60 sec.

The Stormer Viscosimeter contains a spindle in a small cup, about 2½ in. deep, and with the cup filled with mud the spindle is made to rotate at the standard speed of 600 r.p.m. by varying the mass of gravity operated weights. High viscosity muds require weights of as much as 300 grams while low viscosity muds require less weight. The magnitude of the driving weights in grams is used on a conversion chart to give the viscosity in centipoises, a unit of absolute viscosity. There is no direct relationship between Marsh funnel viscosity and absolute viscosity since mud is a plastic substance and does not follow closely the viscosity behaviour of true fluids.

**Gel Strength Test:** Gel strength of muds is usually measured with the Stormer viscosimeter by attaching driving weights to the spindle until the spindle revolves a fraction of

a turn. The initial gel strength is measured as soon as the mud is no longer agitated in the cup, and the magnitude of the driving weights in grams to cause ¼th of a revolution of the spindle is the initial gel strength. The procedure for the 10 min. gel strength is the same as the initial gel test with the exception that the mud is allowed to rest for 10 min. in the cup before testing. The magnitude of the weights in grams required to move the spindle is the 10 min. gel strength. Oilfield muds may have initial gel strength values of 2 to 10 grams and 10 min. values of 10 to 50 grams.

A simple field gel strength test may be performed with the Marsh funnel, after a regular viscosity test has been run, by returning the same mud sample caught from the viscosity test to the wall-supported funnel. The mud sample is then allowed to remain at rest for 10 min. when a second viscosity test is taken, with the time again recorded in sec. If the second viscosity reading exceeds the first viscosity reading by 10 to 15 sec., the gel property of the mud is probably excessive.

**Filtration Test:** The filtration or wall building characteristics of the mud is measured in a low pressure filter press which is operated at 100 p.s.i. A pint or less of mud is placed in a strong-walled cup or cell equipped with a screen and filter paper on the inside bottom, capped with a cover, and placed in a strong frame to hold the assemblage together when under pressure. Compressed air or bottled nitrogen regulated to 100 p.s.i. is connected to the top of the cell and held for 30 min. The squeezed-out filtrate is caught in a graduated cylinder and is read in c.c.'s as fluid loss. When the cell is disassembled the mud cake is extracted and its thickness measured in 30 sec. of an in. There is also a 7½ min. filter press test which may be used. For locations where air or gas under pressure is unobtainable a filter press is available that uses water and a hand pump to create and maintain pressure. Oilfield muds have filtrate losses of a few c.c. to over 25 c.c. and mud cake thickness less than ¼ in.

### COMPONENT CONTENTS TESTS

**Sand and Salt Content:** The sand content of a mud may be determined directly in per cent through the use of a convenient sieve-funnel-calibrated glass tube arrangement. The correct amount of mud—about 50 c.c.—is measured into the glass tube to a given mark, diluted with water and shaken, and poured onto the screen. By a series of water dilutions, shakings, and transfers from tube to screen, repeated until the wash water is clear, the abrasive sand grains are isolated and finally caught in the graduated tube from which the percentage of sand in the mud is read directly.

The amount of salt in a mud is determined by the total chloride ion concentration of the mud filtrate. By means of a titration test on a small quantity of filtrate the total chlorides in the filtrate is reported in parts per million. Sea water contains about 35,000 p.p.m. and the chlorides in a mud fluid should be less than 5,000 p.p.m.

**pH Test:** The pH or hydrogen ion concentration in a mud may be measured quickly and easily with coloured paper test strips. The final colour of the test strip is compared with a standard colour cart and the pH value read directly. Precise values of pH may be measured by an electrometric method. The pH values of water clay muds are around 8.

**Water Hardness Test:** The test for hardness of water, i.e., presence of calcium ion, is a simple test which requires only a standard soap solution, some distilled water, a graduated pipette tube, and a small, capped, bottle for shaking the water and soap mixture. When a permanent foam develops after sufficient addition of soap solution to the water sample and after vigorous shaking, the number of c.c. of soap solution used is divided by the number of c.c. of water sample used and the ratio is multiplied by a constant factor. This gives the calcium ion in parts per million.



## MACHINERY AND EQUIPMENT

### The Determination of Belt Length

An executive mining engineer of the Bell and Zoller Coal Company, America, has evolved a formula for determining the length of belt in a roll. The formula was published in a recent issue of *Mining and Engineering Journal* as a substitute for methods involving calculus.

The formula is:

$$L = \left( d + \frac{(D-d)}{2} \right) \pi N$$

L = length of belt, ft.

d = diameter of hole in centre of roll

D = outside diameter of roll, ft.

N = number of turns on roll

As an example, consider a belt roll having an outside diameter of 4 ft., inside diameter of 0.75 ft. and with 45 laps of belt. What is the length of the belt?  $L = ?$ ;  $D = 4$  ft.;  $\pi = 3.1416$ ;  $N = 45$ .

Substituting in the formula

$$L = \left( 0.75 + \frac{3.25}{2} \right) (3.1416) 45$$

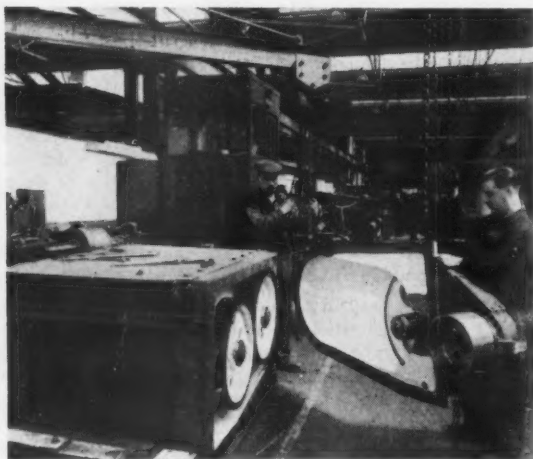
$$L = (2.37) (3.1416) (45)$$

$$L = 335 \text{ ft. of belt.}$$

### Mechanization in Mining

The Tigress mining conveyor driving head is a two-drum machine designed to transmit 60 h.p. at a belt speed of 340 f.p.m. The two fabricated steel driving drums are of 20 in. diameter, powered by electric motor through a fluid coupling and gear train.

The first reduction is through double helical gears, and the second through straight spur gears, all of which are supplied by The Keighley Gear Co. Suitable for conveyor belts 30, 36



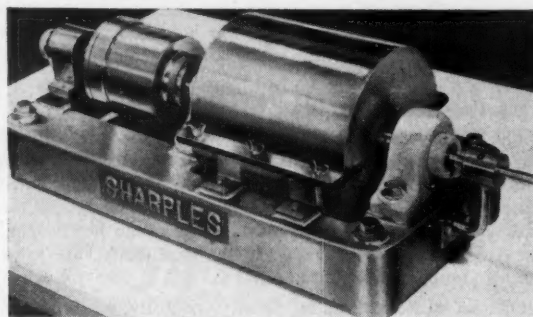
Assembling a Tigress mining conveyor driving head at the Horbury plant of Richard Sutcliffe Ltd.

or 42 in. wide, this type of driving head is used at collieries in Lancashire, Yorkshire, Nottinghamshire and Scotland and at B.E.A. power stations in various parts of the country. The second reduction straight spur gears, as illustrated, are of  $4\frac{1}{2}$  in. face width and have 65 teeth.

### A New Pilot Plant Super-D-Canter

The P-14 Super-D-Canter, manufactured by Sharples Centrifuges Ltd., is well known for the recovery of solids from slurries, and the classification of solid particles according to particle size. The P-14 machine can operate a feed rate of

300-2,500 g.p.h., depending on the particular application, and it has been used for such diverse applications as the dewatering of starch, the classification of clay, the recovery of sodium chloride, benzene hexachloride and other crystalline materials. In general the Super-D-Canter, which develops a centrifugal settling force of 2,100 times the force of gravity, can be used to separate particles of greater than five microns in size, and to discharge the solid and liquid product continuously.



The P-14 Super-D-Canter Unit

In applying the machine to new applications, however, difficulties were encountered since with this type of centrifuge the standard type of laboratory simulation tests are not very satisfactory due to the combined settling and scrolling action in the centrifugal bowl. To overcome this difficulty Sharples have produced a new Pilot Plant Super-D-Canter known as the Model P-4. This machine has an average feed capacity of 1 g.p.m. and a maximum feed rate of up to  $2\frac{1}{2}$  g.p.m., and in consequence test work can now be carried out on as little as 5 gallons of slurry.

The unit consists of a conical bowl, rotated about a horizontal axis, in which the slurry is subjected to centrifugal force, and a screw conveyor, rotated about the same axis as the bowl but at a lower r.p.m., to move the sedimented solids to one end of the bowl for discharge from ports. Other components are a casing, a frame which supports the bowl and casing assembly, and a drive and gear box. The unit is 32 in. long, 30 in. wide and 10 in. high.

### An Improved Model of Respirator

The new improved Pulsafe respirator, manufactured by Safety Products Ltd., is similar in general lines to the Models No. 2, 3 and 22 which the manufacturers have been supplying in the U.K. and overseas for many years past. The new model incorporates certain improvements.

A rubber facepiece, which has been re-designed, and new moulds now in use produce a more efficient and comfortable fit to the face. The new flexible wire-spring assures a proper fit for every face contour, and this in conjunction with headband adjustment makes possible an air-tight seal against the face with minimum pressure. Replacement of the headband is now more simple, as press stud fastening has been adopted in place of wire clips. The screw front is now made from aluminium, as experience has shown that the plastic front fitted into the old model—introduced during the times of metal shortage—does not stand up well to the rigours of industry. Metal parts are now anodized.

Three variations are available, No. 2M with a thin felt filter for protection against dry dust and paint spraying; No. 3M with a sponge ("Spontex") filter suitable in hot dusty atmospheres, and No. 22M with a pad felt filter for protection against very fine dust. Protection in each case is against non-injurious industrial dusts. The complete respirator is 4 oz. in weight, and the facepiece design provides the wearer with a clear unobstructed vision with or without safety goggles.

## METALS, MINERALS AND ALLOYS

At last week's annual general meeting of the British Non-Ferrous Metals Federation, the retiring President, Mr. H. E. Jackson, was able to report a continuation in the improvement of metal exports which had begun to manifest itself last autumn. Nevertheless, he stressed that it was necessary to keep progress in the export position (more especially of copper) in perspective, and he pointed out that until fairly recently the general metal shortage had made it necessary for the metal industries to concentrate practically all their output on home requirements. In consequence they were still exporting only about half of the tonnage exported in the years preceding the Korean War.

Referring to the establishment last year of the International Wrought Non-Ferrous Metals Council, Mr. Jackson noted that real progress had already been achieved by this new piece of European co-ordinating machinery. There have already been exchanges of views and some agreement of policy on such questions as the functioning of the London Metal Exchange, the threat of substitute materials, and the development of new markets. There have also been useful exchanges of information regarding sources of raw material supplies and market trends.

Mr. Jackson referred also to the recent extensions which have been introduced into the scope of the bulletin of British Bureau of Non-Ferrous Metal Statistics which is now aiming gradually to reach the point of providing up-to-date world statistics for the non-ferrous metal industry within the covers of one volume. We might add that if this purpose is in fact achieved, it will constitute a success of the first magnitude, for which all those associated with the metal markets have long been waiting in vain.

**COPPER.**—The U.S. copper corporations are currently caught up in the periodic American ritual of wage negotiations, from which strike action, or at any rate the taking of a strike vote, seems almost inseparable. Anyway, the Mine Mill and Smelter Workers' Union were due to take a nationwide strike vote of about 100,000 workers in the smelting industry yesterday. All the big producers, as well as the custom smelters and fabricators appear to be threatened. Typical of the Union's demands appear to be those of American Brass employees, who are demanding *inter alia* wage increase of 25 c. an hour, a 35 hour week with 40 hours' pay, up to three weeks' leave for long service employees, and increased health welfare and pension benefits. The productivity experts would need to work overtime to absorb that lot!

Bache and Co., writing understandably from an *ex parte* position, are quoted in a recent issue of *The American Metal Market* as attributing the successful dispersal of Chile's surplus stocks and current production in large measure to the marketing policy pursued by the Central Bank of Chile. Recalling that it has long been the policy of the U.S. copper producers, both in the States and in Chile, to sell only through fabricators and to refuse to supply copper to metal dealers, Bache and Co. point to the reversal of this policy by the Central Bank, which, once it decided to sell at the world price, was prepared to sell to any buyers (other than iron curtain countries). They suggest that

this decision brought into the market American and European copper dealers, who had previously always been unable to buy Chilean copper and that the greater marketing flexibility and skill enjoyed by these specialists contributed materially to the smooth absorption of the Chilean surplus. Obviously this is the kind of contention which it is almost impossible to prove in retrospect, but nevertheless the suggestion provides interesting food for thought.

In the event, June sales proved slightly lower than was forecast here last week, amounting only to 102,500 tons compared with 99,000 in May. But bookings for July are heavy and custom smelters are already sold out. Copper supplies remain tight and there seems no immediate cause to look for lower prices. Indeed, if the present American wage negotiations were to lead to strike action, the immediate supply position might become difficult.

**LEAD AND ZINC.**—The U.S. lead and zinc markets have still to get back into their stride which was halted with the recommencement of G.S.A. stockpile purchases and which still awaits clarification of the Government's purchasing programme in the new fiscal year as well as of the President's intentions regarding tariff increases.

**TIN.**—The London cash price has remained firm and steady in the £750's with a backwardation of £5 to £10. Now that the ratification of the International Tin Agreement is assured and the future of the Texas smelter has been settled for another year, it is difficult to see much cause for any considerable fluctuation in the tin price over the next few months. Moreover, with the Texas smelter drawing off the greater part of the prospective surplus for this year, coupled presumably with the need for the producing countries to accumulate their buffer stock contributions, continued tightness of prompt metal may be anticipated and with it a continued backwardation.

Trading in New York over the past week has been moderately active with the tin price firm. It is reported that the United States has concluded an agreement whereby Bolivia will supply 12,000 tons of tin in concentrates to the U.S. for a period to end in April, 1955, the price, the report states, to be based on the prevailing market price.

The American can manufacturers appear to be going out of their way at the moment to emphasize the efforts which they are making to develop satisfactory substitute canning materials (see this column last week) as a hedge against the possible loss of Far Eastern supplies in the event of Communism over-running Indo China and the rest of South-East Asia. Somehow from where we sit, all this "to do" seems slightly dramatic so long as the U.S. Government has upwards of five years' tin requirements safely stockpiled. Nevertheless, these efforts are being made and must be taken into account in assessing the future trend of consumption. Some measure of the success, which the canning and other tin using industries have attained in tin conservation and substitution, can be gauged from the fact that world tin consumption is to-day running at about the same level as 20 to 25 years ago, while the general level of

# WILFLEY

## JAW CRUSHERS

## BALL MILLS

## CONCENTRATING TABLES

## CENTRIFUGAL SAND PUMPS

## MACE SMELTING FURNACES

## MACE SINTERING HEARTHES

**THE WILFLEY MINING MACHINERY CO. LTD. Salisbury House, London, E.C.2**

TELEPHONE NATIONAL 5876

TELEGRAMS "WRATHLESS, LONDON"

industrial production has of course grown immeasurably greater. So far as we know, there is no one metal that will serve as a universal substitute for tin, but specially treated steel and aluminium as well as steel with aluminium, zinc or nickel coatings, are all a potential threat to tin. This, of course, is quite aside from the development of other packaging materials brought about by the changing nature of the food preservation problem through the popularization of deep freeze methods.

Mid-year forecasts of U.S. tinplate producers seem to point to a declining production in the third quarter of this year, with year-end production coming out at the same or possibly a little less than last year's total of 4,162,000 l.tons.

The table below gives latest available output figures of tin concentrates for the current year compared with the corresponding period a year ago. These figures still seem to point to a definite falling off in production, which will no doubt become accelerated once export controls are fixed under the Tin Agreement.

Country	Period	1954	1953
Belgian Congo .....	Jan-May	3,640	5,605
Bolivia* .....	Jan-March	5,501	8,076
Indonesia .....	Jan-May	13,172	12,743
Malaya .....	Jan-May	24,485	23,270
Nigeria .....	Jan-April	2,643	2,955
Thailand .....	Jan-March	2,291	2,656

\* Exports

**ANTIMONY.**—The U.S. market for antimony ores continues to show strength with quotations last week showing increases of 10 to 25 c. per unit for higher grade ores. Sixty-five per cent ore was, at the end of June, being quoted at \$425-450 per unit.

**CHROME.**—Turkish chrome miners and exporters are reported to be seeking Government aid to get them over their present marketing difficulties. They have asked their Government to suspend all taxes and fees on chromium production and exports and have also asked to be granted export licences, which presumably means licences to sell at whatever acceptable price they can obtain, rather than at the Government controlled export price, which is at present pricing the Turkish industry out of the market.

**TUNGSTEN.**—It will be recalled that the South Korean Government closed down their tungsten mines earlier this year on the expiry of the U.S. contract which had previously called for 15,000 tons a year. Now at the beginning of July, the Government owned Tahehan Tungsten Corporation has resumed production at two of its mines at the low rate of 220 tons per month. The ore is to be stored until foreign purchasers can be found.

On Wednesday of this week tungsten ore prices in New York were quoted fractionally lower at \$22 to \$22½ per s.ton unit plus duty, against \$22 to \$23 previously.

## The London Metal Market

(From Our Metal Exchange Correspondent)

Apart from a sharp rise on Tuesday afternoon of £5 in the forward quotation in London which was reflected in the Eastern market the following day, tin has maintained a very steady tone with prices fluctuating within narrow limits. The only other feature of prominence following a marking down last week of stocks in official warehouses by about 190 tons is the sudden widening of the backwardation. This has remained steady at anything up to £2 until the end of last month as compared with a rate of about £12 at present. On Thursday morning the Eastern price was equivalent to £759½ per ton c.i.f. Europe.

The present position with regard to the Tin Agreement is that the Interim Committee is due to meet in London on July 12 to discuss ways and means of implementing the scheme and to set a deadline for ratification to be completed by member countries.

The lead and zinc quotations have shown very little change during the past week and the turnover in both metals has been rather on the low side, which is only to be expected with the approach of the holiday season. There is nothing further to

report from America as to the proposed long-term stockpiling of these metals, and producers are urging strongly for tariff relief to restrict imports.

The present price level of copper has been well maintained, and at the moment there is no reason to anticipate any weakening in the London quotation, although this position could change in the event of any selling pressure being exerted against arrivals of Chilean metal. The American market is still very firm, with sales of July delivery being reported at a good level. The President has signed the Bill suspending the U.S. import tax on copper for a further year up to June, 1955.

Closing prices and turnovers are given in the following table:—

	July 1		July 8	
	Buyers	Sellers	Buyers	Sellers
<b>Tin</b>				
Cash .....	£755	£756	£758	£759
Three months .....	£747½	£748	£746½	£747
Settlement .....		£756		£759
Week's turnover .....		755 tons		445 tons
<b>Lead</b>				
Current month .....	£96½	£96½	£96½	£97
Three months .....	£94½	£94½	£94½	£95
Week's turnover .....		2,400 tons		2,150 tons
<b>Zinc</b>				
Current month .....	£78	£78½	£78½	£79
Three months .....	£79	£79½	£79½	£79½
Week's turnover .....		3,925 tons		3,650 tons
<b>Copper</b>				
Cash .....	£239½	£239½	£239½	£239½
Three months .....	£237	£237½	£237½	£237½
Settlement .....		£239½		£239½
Week's turnover .....		3,400 tons		2,950 tons

## OTHER LONDON PRICES — JULY 8

### ANTIMONY

English (99%) delivered,		
10 cwt. and over .. ..	£210	per ton
Crude (70%) .. ..	£200	per ton
Ore (60% basis) .. ..	22s./24s.	nom. per unit, c.i.f.

### NICKEL

99.5% (home trade) .. ..	£483	per ton
--------------------------	------	---------

### OTHER METALS

Aluminium, 99.5%, £156 per ton	Osmium, £50 oz. nom.
Bismuth	Palladium, £7 10s. oz.
(min. 4 cwt. lots) 16s. lb.	Platinum, £30/£31
Cadmium (Empire), 13s. lb.	Rhodium, £43 10s. oz.
Chromium, 6s. 5d./7s. 6d. lb.	Ruthenium, £23 oz.
Cobalt, 20s. lb.	Quicksilver, £97 10s./£100
Gold, 249s. 1d. f.oz.	ex-warehouse
Iridium, £52 10s. oz. nom.	Selenium, 35s. 9d. nom.
Magnesium, 2s. 6d. lb.	per lb.
Manganese Metal (96%-98%)	Silver 73½d. f.oz. spot and
£225/£262	72½d. f.d.
Osmiridium, £40 oz. nom.	Tellurium, 15s./16s. lb.

### ORES, ALLOYS, ETC.

Bismuth .. ..	40% 6s. 3d. lb. c.i.f.
	30% 5s. 0d. lb. c.i.f.
<b>Chrome Ore—</b>	
Rhodesian Metallurgical (lumpy)	£13 12s. per ton c.i.f.
Refractory	£13 4s. per ton c.i.f.
Magnesite, ground calcined ..	£26-£27 d/d
Magnesite, Raw .. ..	£10 - £11 d/d
Molybdenite (85% basis) ..	102s. 4d.-103s. per unit c.i.f.
Wolfram (65%) .. ..	World buying 150s.-155s. nom.
" .. ..	U.K. Selling 155s. + 10s.
" .. ..	charges
Scheelite (65%) .. ..	World buying price nom.
" .. ..	U.K. Selling 155s. + 10s.
" .. ..	charges
Tungsten Metal Powder ..	15s. 3d. nom. per lb. (home)
(98% Min. W.)	
Ferro-tungsten .. ..	12s. 3d. nom. per lb. (home)
Carbide, 4-cwt. lots .. ..	£35 13s. 9d. d/d per ton
Ferro-manganese, home ..	£54 15s. 0d. per ton
Manganese Ore Indian c.i.f. Europe	
(46%-48%) .. ..	6s. 8d. per unit
Brass Wire .. ..	2s. 6½d. per lb. basis
Brass Tubes, solid drawn ..	1s. 10½d. per lb. basis



# THE MINING MARKETS

(By Our Stock Exchange Correspondent)

The principal feature in Kaffirs was the advance of finance shares. It is noteworthy that little attention has been paid to these recently and the leaders are bound to benefit from the development of many new mines. Those principally affected by this rise were Anglo American Corporation, Consolidated Goldfields, H.E. Proprietary and Strathmore.

Among individual mines, the picture was less bright. The June monthly returns produced little of sensational interest so far as the older properties were concerned. Disappointment with the Randfontein and Luipaards Vlei results was reflected by falls in the share prices. Rumour suggests that the latter mine is now making less profit from gold and that it has as yet not fully benefited from uranium production. Rose Deep were also marked down. The company made less profit despite maintained tonnage and lower working costs.

In the Orange Free State, by contrast, there was considerably more interest. Persistent buying of Ofits caused a sharp rise in price. The assessment of the first results from the Freddie Consolidated property is difficult, but it is certain that a considerable reduction on working costs has been achieved. President Brand were supported and the price remained unchanged, but the greatly improved profits of President Steyn created demand for the shares. Despite better returns, St. Helena eased off. The slight improvement in the Welkom figures was considered disappointing by the market and sellers appeared.

West Africans were again very quiet. Good figures from Ariston and a higher working profit failed to stir the market. Ashanti turned easier. The now familiar pattern of a reduced monthly working profit, coupled with good development results, failed to stimulate interest either way.

In the West Australian section, there was much more interest. Negotiations are in hand with regard to Boulder Perseverance. The directors have advised stockholders not to sell their shares.

The name of a possible bidder has not been disclosed, but some market circles have coupled the name of Gold Mines of Kalgoorlie with this development. It will be recalled that this concern has recently made a bid for the shares of South Kalgoorlie.

The publication of the diamond sales figures for the first six months of the current year shows that business has been well maintained. This, coupled with the improvement in the leading O.F.S. shares, caused a big jump in De Beers Consolidated and a general hardening of prices in this market.

Rhodesian coppers were rather neglected and there was some profit-taking, mostly due to the switching of interest elsewhere. The investment demand for Chartered was maintained and there was a steady undertone in the whole market. The big news in copper shares was the announcement of a Spanish bid for Rio Tinto assets in Spain. The sum of £7,600,000 has been offered for a two-third interest in the local operating company. Rio Tintos are to retain a third. In recent years, practically no profits have been remitted to this country due to discriminatory taxation. The new agreement should therefore benefit Rio Tinto. With a majority Spanish interest in the mine, there may well be some remission of taxation. Tharsis Sulphur rose in sympathy.

Both Eastern and Nigerian tin shares were better due to the higher metal price and the more settled conditions brought about by the recent international agreement. Bisichi are paying 40 per cent for the year against 35 per cent for the corresponding period. The profits before tax are up, by some £90,000. The Gold and Base Metal mines dividend of 7½ per cent caused considerable disappointment and the shares turned weaker.

Consolidated Murchison encountered strong buying from Johannesburg and the shares jumped 2s. 6d. Wankie Colliery has against restored full production and the shares continued their upward movement.

FINANCE	Price July 7	+ or - on week	O.F.S.	Price July 7	+ or - on week	MISCELLANEOUS GOLD	Price July 7	+ or - on week	TIN (Nigerian and Miscellaneous) contd.	Price July 7	+ or - on week
African & European...	24½	+½	Freddie...	6/-	+3d	(contd.)			Geevor Tin	11/4½	-1½d
Anglo American Corp.	7½	+½	Freddie Consolidated	19/9	-6d	St. John d'el Rey	17/7½	+1/4½	Gold & Base Metal	2/10½	-1½d
Anglo-French	22/6	+1/3	P. S. Geduld	4½	-½	Zams	37/6	+2/-	Jantar Nigeria	9/-	-1½d
Anglo Transvaal Consol.	22/6		Geoffries	12/6	+3d	DIAMONDS & PLATINUM			Jos Tin Area	13/-	
Central Mining (E1 shrs.)	34/6	+1/8	Harmony	34/3	-3d	Anglo American Inv.	5½	-½	Kaduna Prospectors	2/4½	-1½d
Consol. Mines Selection	48/-	+6d	Voraine	10/-	-3d	Casts	23/6	+6d	Kaduna Syndicate	2/6	+3d
East Rand Consols.	34/4½	+1/3	Lydenburg Estates	16/9	+3d	Cons. Diam. of S.W.A.	5½xd	+1/4	London Tin	6/3	+1½d
General Mining	3½	+½	Merriespruit	10/9	-1½d	De Beers Defd. Bearer	5	+4/4	United Tin	2/9	
H.E. Prop 5/- Shares	10/3		Middle Wits	13/9	+9d	De Beers Pfd. Bearer	16½	-1½d			
Henderson's Transvaal	7/-		Ofits	60/-	+6/3	Pots Platinum	9/3		SILVER, LEAD, ZINC		
Johnnies	43/3	+3d	President Brand	62/6		Watervaal	15/6		Broken Hill South	48/-	+3d
Rand Mines	3½	-½	President Steyn	32/9	+1/9	COPPER			Burma Mines	2/7½	+1½d
Rand Selection	48/-	+6d	St. Helena	26/-	-10½d	Chartered	77/-	+9d	Consol. Zinc	35/-	-6d
Strathmore Consol.	27/6	+3/9	Virginia Ord.	12/9	-1½d	Esperanza	6/4½		Lake George	8/-	+6d
Union Corp. (2/6 units)	28/-	+1/3	Welkom	18/9	-1/6	Indian Copper	4/9		Mount Isa	45/-	+1/-
Vereniging Estates	4½xd	+½	Western Holdings	4½		Messina	4½		New Broken Hill	27/3	-6d
Wits	34/6	+1½d				Nchanga	8½		North Broken Hill	64/3	+6d
West Wits	40/-	+6d				Rhod. Anglo-American	72/6		Rhodesian Broken Hill	11/7½	-3d
RAND GOLD			WEST AFRICAN GOLD			Rhod. Katanga	13/-		San Francisco Mines	19/9	+3d
Blyvoors	31/9		Amalgamated Banket	1/4½		Rhodesian Selection	19/1½	+7½d	Urwira	4/3	-3d
Brakpan	7/-	-4½d	Ariston	6/1½		Rhokana	24½		MISCELLANEOUS		
City Deep	18/3	-3d	Ashanti	19/-	-3d	Rio Tinto	34½	+8	BASE METALS & COAL		
Consol. Main Reef	37/6	+1½d	Bibiani	4/3		Roan Antelope	17/7½	+1½d	Amal. Collieries of S.A.	45/-	
Crown	3½	-½	Bremang	1/9		Selection Trust	40/7½	+7½d	Associated Manganese	47/-	-1/-
Daggs	23/3	+3d	G.C. Main Reef	3/3	-1½d	Tanks	90/7½	-1/3	Cape Asbestos	25/-	-1/-
Doomfontein	28/1½	+3d	W. Selection & Dev.	6/1½	-1½d	Tharsis Sulphur Br.	57/6	+11/3	C.F. Manganese	40/6	+1/-
Durban Deep	11/-xd		Konongo	2/3		TIN (Eastern)			Consol. Murchison	42/6	+2/6
E. Daggs	25/9	+½	Lyndhurst Deep	9½		Ayer Hitam	26/-	+6d	Mashaba	3½	-1½
E. Geduld (4/- units)	25/9	+½	Marlu	1/-		Gopeng	8/9	+1½d	Natal Navigation	1/3	
E. Rand Props	2½	+½	Maquah & Abosso	2/-	-1½d	Hongkong	8/6	+7½d	Rhod. Monteleo	82/6	+6d
Geduld	11/-	-3d	AUSTRALIAN GOLD			Ipoth	15/6		Turner & Newall	15/-	+4½d
Govt. Areas	18/-	-3d	Boulder Perseverance	7/-	+2/6	Kamunig	8/4½	-1½d	Witbank Colliery	4½	
Grootvlei	10/9	+6d	Gold Mines of Kalgoorlie	14/6	+1/-	Kepong Dredging	3/9	-3d	CANADIAN MINES		
Libanon	19/6	+6d	Great Boulder Prop.	8/10½	+4½d	Kinta Tin Mines	10/6	+3d	Dome	\$27	-1
Luipaards Vlei	16/3	+3d	Lake View and Star	14/3		Pahang	11/10½	+4½d	Hollinger	\$28½	
Marievale	17/9	-6d	Mount Morgan	19/-	+1/3	Pengkalen	9/1½	+1½d	Hudson Bay Mining	\$85	+1
Modderfontein East	13/-	-6d	North Kalguri	7/9	+4½d	Petaling	7/9	+3d	International Nickel	\$76½	
New Kleinfontein	12/3	-6d	Sons of Gwalia	4/4½	+9d	Rambutan	16/6	+3d	Mining Corp. of Canada	\$5½	+½
New Pioneer	59/-	-2/-	South Kalguri	13/3	+4½d	Siamse Tin	7/6	-1½d	Noranda	\$134	-1
Randfontein	16/-	-9d	Western Mining	13/9	+4½d	Southern Kinta	17/3	-3d	Yukon	\$7	+½
Robinson Deep	12/-	-2/-				S. Malayan	23/9	+6d			
Rose Deep	3/10½					S. Tronoh	9/6	+6d	OIL		
Simmer & Jack	20/-	-7½d	MISCELLANEOUS GOLD			Sungei Kinta	10/6	-6d	Anglo-Iranian	12½	-½
S.A. Lands	3/1½	-1½d	Cam and Motor	8/6	-1½d	Tekka Taiping	5/9		Apex	54/4½	-1/4½
Springs	29/1½	+4½d	Champion Reef	4/9	-3d	Tronoh	23/-		Attcock	52/6	+1/3
Stillfontein	37/6	-7½d	Falcon Reef	7/4½		TIN (Nigerian and Miscellaneous)			Burmah	82/6	-3/1½
Sub Nigel	3/3	-6d	Globe & Phoenix	25/9	-9d	Amalgamated Tin	14/3	+3d	Canadian Eagle	31/3	-1/-
Van Dyk	11/9	+6d	G.F. Rhodesian	4/10½		Beralit Tin	25/9	+1/-	Mexican Eagle	17/3	-3d
Vlaakfontein	13/3		London & Rhodesian	4/4½		Bisichi	6/3	+1½d	Shell (bearer)	5½xr	
Vogelstruisbuit	34/-	+6d	Motapa	1/3	-3d	British Tin Inv.	16/6	+10½d	Trinidad Leasehold	23/3	-1/1½
West Driefontein	5½	-7½d	Mysoor	5/-	-3d	Ex-Lands Nigeria	2/10½	-1½d	T.P.D.	25/6	-9d
W. Rand Consolidated	50/-	-7½d	Nundydroog	6/3	-1½d				Ultramar	29/6	-1/6
Western Reefs	46/10½	-7½d	Ooregum	4/-							

## COMPANY NEWS AND VIEWS

### Continued Strength of Diamond Market

During the first six months of 1954 sales of rough diamonds effected by the Central Selling Organization on behalf of South African and other producers reached a total of £31,700,000 and if this rate continues there seems no reason why the total diamond sales for 1953, which amounted to £61,100,000, should not be exceeded.

As will be seen from the table below, while gem sales for June are slightly below those for March they are well above the June quarter figure for 1953. In addition, despite forecasts of a fall in the sales of industrial diamonds if the two quarters June and March, 1954, are taken together, the resulting figure shows that a higher level has been achieved than in the corresponding period of 1953. It should be remembered, however, that these figures must reflect to some extent the unexpected stockpiling which took place during the first part of 1954 and future declines in sales of industrial diamonds should therefore cause no great surprise.

Quarter	Gems	Industrials	Totals
1954	£	£	£
June	11,737,546	3,326,371	15,063,917
March	11,773,849	4,881,215	16,655,064
Total for six months	23,511,395	8,207,586	31,718,981
1953	£	£	£
December	10,733,315	4,835,352	15,568,667
September	9,303,346	4,833,746	14,137,092
June	8,792,258	4,084,716	12,876,974
March	14,507,190	4,066,018	18,573,208
Total for 1953	43,336,109	17,819,832	61,155,941

### G.M. of Kalgoorlie's Increased Earnings and Share Bid

Figures from a preliminary profit statement issued by Gold Mines of Kalgoorlie (Aust.) show that the net profit earned during the year ended March 31, 1954, rose to a figure of £184,265 as against £164,319 previously. Dividends paid on the company's issued ordinary capital of £768,438 in stock units of 10s. were increased to a total of 15 per cent as against 12½ per cent previously. This distribution absorbed a total of £115,266 (£96,055) and a balance of £165,897 was carried forward which compares with £102,692 for the preceding period.

It has also been disclosed that an offer has been made by the company for the acquisition of the whole of the issued capital of South Kalgurli Consolidated at a price of 13s. per share. This price may be satisfied either by a cash payment or by a combination of cash and shares.

Our Australian correspondent writes that the merger between this company and Gold Mines of Kalgoorlie (Aust.) Ltd. is regarded very favourably, the opinion being that it will be beneficial to both companies. Development possibilities below the 2,000 ft. horizon in South Kalgurli are distinctly favourable, based on results of deep development in the neighbouring Lake View and Star and Great Boulder mines, and the financial strength of Gold Mines of Kalgoorlie will ensure ample funds to carry out this work. An objection from an operating viewpoint is that the two mines do not adjoin. Inclusion of the South Kalgurli leases will make a very important addition to the property of Gold Mines of Kalgoorlie, which now holds a long line along the eastern part of the Kalgoorlie field.

### Rand and O.F.S. Returns for June

The most prominent features of the Rand and O.F.S. Gold Mining Returns for June have been amongst the Orange Free State mines which have made considerable further progress. During the month a price for gold of 248s. 1d. per oz., the same as for the previous month, was received and the figures listed opposite are based on this price.

A sharp advance was made by President Steyn whose profits increased during the month by over three times their previous figure due to a sharp drop in costs. At Welkom there was an improvement in profits while costs remained constant. St. Helena, however, recorded characteristic steady progress with a further increase in profits and a fall in costs. On the other hand the latest profits published by Randfontein indicate that

this company has not yet overcome the technical difficulties it is encountering in its uranium treatment plant. Once again, therefore, investors must wait until a satisfactory production basis has been achieved before a firm assessment of future profitability can be made.

Company	June, 1954			Yr. ends	Current Financial Year			Yr. ends	Last Financial Year		
	Tons (000)	Yield (oz.)	Profit (£000)		Tons (000)	Yield (oz.)	Profit (£000)		Tons (000)	Yield (oz.)	Profit (£000)
<b>Gold Fields</b>											
Doornfontein	50	16,135	76.6	J	379	113,935	449.8		—	—	—
Libanon	97	20,041	50.2	J	1081	221,407	574.1	985	197,552	500.6	500.6
Luipaards Vlei	109	21,400	46.6	J	1285	241,563	508.1	1232	231,234	568.1	568.1
Rietfontein	28	6,301	23.9	D	166	37,273	144.1	158	35,479	152.1	152.1
Robinson	101	21,321	25.7	D	580	141,825	140.7	577	110,839	77.5	77.5
Simmer & Jack	125	20,328	8.1	D	756	121,882	64.5	723	117,857	76.5	76.5
Sub Nigel	66	21,945	96.2	J	796	263,299	193.2	788	270,871	1352.0	1352.0
Venterspost	112	26,342	60.1	J	1299	302,235	699.3	1219	285,071	726.0	726.0
Vlakfontein	38	13,866	70.2	D	230	82,020	425.9	216	78,924	420.3	420.3
Vogels	103	26,198	108.4	D	613	155,032	648.7	570	144,131	574.3	574.3
West Drie	52	38,346	300.1	J	558	409,750	3286.5	386	261,743	2032.7	2032.7
<b>Anglo American</b>											
Brakpan	114	18,303	8.0	D	664	112,363	84.3	684	122,492	124.7	124.7
Daggas	226	52,431	321.6	D	1311	305,338	1874.2	1315	310,551	2010.6	2010.6
East Daggas	94	15,983	45.5	D	558	94,855	276.6	536	93,652	289.3	289.3
President Steyn	41	10,784	17.3	D	108	27,985	23.3	—	—	—	—
S.A. Lands	101	18,602	55.1	D	598	109,954	322.2	597	108,631	303.9	303.9
Springs	130	18,119	7.4	D	776	108,791	46.2	889	122,599	65.2	65.2
Welkom	77	15,396	8.0	D	413	82,181	11.9	361	71,785	97.6	97.6
Western Hlds.	48	16,921	67.7	D	272	91,462	288.6	—	—	—	—
West. Reef Ex.	118	23,047	64.7	D	686	135,684	389.6	646	133,037	486.9	486.9
<b>Central Mining</b>											
Blyvoor	105	60,352	470.5	J	1193	698,392	5596.1	1129	732,733	6172.7	6172.7
City Deep	162	30,973	14.1	D	976	185,905	102.4	943	183,222	139.6	139.6
Cons. M.R.	183	25,807	30.1	J	2022	285,762	271.2	2107	293,871	269.7	269.7
Crown	296	46,441	50.0	D	1657	263,909	288.8	1583	253,745	227.2	227.2
D. Roopepoort	182	30,114	50.2	D	1040	172,765	258.8	1066	182,048	430.9	430.9
East Rand Prop.	208	47,756	125.9	D	1172	267,226	703.5	1113	243,438	609.1	609.1
Modder B.	56	5,903	2.5	D	336	35,240	15.4	322	34,875	10.4	10.4
Modder East	116	13,221	12.3	J	1362	56,048	156.2	1382	159,447	238.4	238.4
Rose Deep	73	10,914	12.2	D	416	64,000	73.1	442	65,129	43.6	43.6
Weigedacht	31	3,835	2.0	J	397	48,765	29.1	401	49,815	51.7	51.7
<b>J.C.I.*</b>											
E. Champ d'Or	21	2,352	5.0	D	141	14,008	14.2	145	23,816	11.7	11.7
Freddies Cons.	84	14,409	127.0	D	436	73,703	111.6	—	—	—	—
Govt. G.M.A.	262	33,853	30.0	D	1545	200,185	180.1	1452	198,938	350.5	350.5
Randfontein	277	36,977	138.3	D	1718	229,743	102.7	1833	236,306	166.8	166.8
<b>Union</b>											
East Geduld	136	41,823	304.8	D	796	244,750	1782.3	806	241,796	1793.4	1793.4
Geduld Prop.	96	15,618	29.0	D	543	88,522	151.2	571	89,955	195.0	195.0
Grootvlei	183	38,889	218.4	D	1067	227,157	1268.9	1095	233,740	1380.2	1380.2
Mariavale	65	16,615	73.9	D	383	97,426	421.9	370	90,817	397.2	397.2
St. Helena	84	18,692	53.5	D	471	103,937	296.7	372	74,122	113.2	113.2
Van Dyke	79	13,593	1.2	D	469	81,327	11.7	543	87,618	31.5	31.5
<b>General Mining</b>											
S. Roopepoort	27	5,828	20.1	J	328	71,254	242.5	322	73,709	279.0	279.0
W. Rand Cons.	224	29,373	185.5	D	1331	164,522	1075.0	1340	188,345	549.1	549.1
<b>Anglo Transvaal</b>											
N. Klerksdorp	10	1,200	12.6	D	67	4,091	17.3	61	8,427	5.3	5.3
Rand Leases	184	30,823	43.7	J	1984	339,159	278.3	2041	346,611	490.9	490.9
Village M.R.	34	5,223	12.0	J	410	—	142.0	405	63,228	166.0	166.0
<b>Others</b>											
Ellatton Gld Mng	28	8,748	47.1	D	155	42,586	176.4	—	—	—	—
N. Kleinfontein	108	13,376	12.9	D	643	80,181	92.6	634	82,239	160.3	160.3
Nigel Gold	28	4,401	3.9	D	165	25,415	19.5	189	26,466	13.2	13.2
Spaarwater	11	2,777	0.3	D	64	15,892	0.5	61	14,144	20.2	20.2
Stillfontein	17	31,239	188.0	D	484	159,314	892.0	367	103,427	494.4	494.4
W. Nigel	89	3,838	9.1	J	208	46,482	102.5	202	—	90.0	90.0

\* Gold and uranium

† Including £180,000 from uranium sales

Notes.—Profit figures are in all cases figures of working profit excluding profit from sale of gold at premium prices. In cases of groups marked with an asterisk (\*) profit includes sundry revenue. Profit figures preceded by L indicates a loss

### Gold and Base Pays 7½ per cent on Increased Capital

The full report and accounts of Gold and Base Metal Mines of Nigeria covering operations for the year ended December 31, 1953, shows that the total revenue earned by the company increased to £476,085 from £452,900 previously.

This was due to the sharp increase in the output of columbite concentrates which rose to a total of 93 s.tons as compared with 30 tons in the previous year and more than offset the lowered earnings from tin production which declined by 18 l.tons to 552 l.tons. After expenses, taxation, etc., a net profit of £31,443 remained as compared with £33,109 last year and a dividend of 7½ per cent (15 per cent) was recommended on the issued ordinary capital in stock units of 2s. 6d. which was increased from £350,000 to £600,000 during the year.

Of particular concern to the fortunes of this company is the progress of the programme upon which it has embarked for the development of columbite, and while the objective of

this programme is to achieve an annual production of at least 200 s.tons by 1955, production for the first four months of the current year shows that although 53 tons have been produced as against 36 tons in the corresponding period of last year, much headway is still to be made.

Further information of this subject will, however, be reported by the chairman, Major General W. W. Richards, at the annual general meeting of the company which will be held on July 28 in London.

### May Tin Returns

The feature emerging from the tin production returns for May of the producers listed in the table below is that several companies show startling increases in production over the corresponding period of their previous financial year. Of particular prominence in this regard are Larut Tin Fields, Lower Perak, Renong, Southern Kinta and Tambah. It should be noted, however, that in the case of Siamese Tin Syndicate the production of Bangrin Tin Dredging, the acquisition of which company took place recently, has been included.

Company	May	Months since year end	Financial Year to Date		Company	May	Months since year end	Financial Year to Date	
			This	Last				This	Last
EASTERN									
Ampat*	74	5	460	489	NIGERIA				
Batu S.	15	8	170	138	Filani	3	5	15	23
Berjuntai	63	1	63	60	Gold & Base	38	5	203	216
Ipoh Tin	43	2	78	—	Gold & Base†	9	5	45	28
Kamunting	75	2	184	239	Jantar	18	8	136	146
Kinta K.	27	2	45	42	Jantar†	18	8	142	150
Kinta T.	25	5	120	116	Jos Tin	12	10	122	132
Klang River	30	2	70	83	Kaduna P.	5	5	31	50
Kuala K.	194	2	380	396	Kaduna S.	16	5	112	127
Kuchai	27	8	197	376	Keffi	11	2	17	—
Larut	91	5	408	206	Keffi†	34	2	59	—
Lower Perak	204	1	204	71	Lond. Nig.	21	1	21	15
Malaysiam	72	2	172	94	Lond. Nig.	2	1	2	—
Pahang	220	10	220	220	Naraguta Ex.	7	5	19	29
Rahman H.	42	11	440	448	Naraguta K.	7	5	69	53
Rantau	63	11	724	933	Naraguta T.	13	5	84	95
Rawang Conc.	64	2	124	148	Naraguta T.†	4	5	34	18
Rawang Tin	50	2	99	117	Ribon	5	2	11	12
Renong	51	11	1002	319	Rukuba	1	2	2	4
S. Kinta	449	2	929	644	S. Bukeru	6	5	34	30
Siamese Tin	138	5	821	—	S. Bukeru†	—	5	2	8
Sungei Kinta	37	5	119	—	Tinfields of Nig.	12	2	4	—
Taipung	20	5	272	—	Tinfields of Nig.†	13	2	4	—
Tanjong	20	5	101	35	U. Tin	10	11	86	123
Tanjong	67	5	291	284	U. Tin†	0.050	11	465	2.750
Tongkah	35	11	385	519	MISC:				
NIGERIA									
Amal. Tin	353	2	661	634	Beral† Tin	6	2	9	17
Amal. Tin†	53	2	101	92	Beral† Tin	170	2	300	346
Bisichi	44	5	233	213	Greevor	35	2	108	108
Bisichi†	23	5	96	58	S. Croft† Tin	32	5	254	229
Ex-Lands	40	5	292	271	S. Croft† Tin	3	5	4	1

\* Company's Bidor Dredge closed down on May 17, 1954 for repairs  
† Columbite  
‡ Wolfram

† Including output from Bangrin dredge  
‡ Columbite production commenced March 1954

### Kaduna Syndicate's Stock Losses

Despite an increase of production to 327 tons of tin concentrates produced as compared with 271 tons previously, a stock loss of £15,883 against a credit last year of £20,854 was primarily responsible for a fall in the net profit of Kaduna Syndicate during the year ended December 31, 1953. The company's larger output, while due to some extent to the greater yardage of ground treated and also to the higher rainfall, also resulted from the better grade of ground worked, which rose from a total of .64 lb. per cu. yd. previously to .66 lb. per cu. yd. A decrease in working costs was also achieved and the average per ton of concentrate delivered f.o.r. was £232 6s. 1d. as compared with £272 7s. 9d. in the preceding period.

From the sale of a total of 345 tons of tin-ore against 225 tons in the previous year, together with a small amount of additional income, the total revenue earned by the company rose to £177,937 as against £159,126.

Year to Dec. 31	Sales of Tin-ore	Other Income	Net* Profit	Divi- dends	To Reserve	Carry Forward
£	£	£	£	£	£	£
1953	174,510	4,623	13,222†	13,200	1,415†	12,764
1952	154,503	3,427	20,272	19,500	1,800	12,651

\* After all expenses which included Nigerian mining charges of £108,145 (1952—£110,681) and stock losses £15,883 (1952—Cr. £20,854)

† Represents transfer for staff superannuation

‡ Does not include Cr. £1,506 being a previous provision no longer required

Dividends paid on the company's issued ordinary capital of £48,000 in 1s. shares were accordingly reduced from 75 per cent paid previously to a total of 50 per cent.

Due to the fact that old tailing dumps in the Werran areas have now been completely cleaned up the production from this source will not reach last year's figure. It is to be expected, therefore, that the company's output during the current financial year will be less than it was in the preceding period. Meeting, July 13, London. Capt. Hugh Vivian is chairman.

### Kaduna Prospectors Dividend Maintained

A considerable increase in the production of tin concentrates to 116 tons (compared with 77 tons in the previous year) was achieved by Kaduna Prospectors during the year to December 31, 1953. This was, however, due mainly to the higher grade of ground worked which increased to .68 lb. per cu. yd. as compared with .51 lb. per cu. yd. during the previous year. In addition the better water supply during the year contributed towards the increase in production. It was also possible to reduce costs and the average per ton of concentrates delivered f.o.r. was £250 6s. 11d. as compared with £331 17s. 7d. in the preceding period.

Despite falls in the tin price during the year total revenue earned by the company showed a marked rise due to this high level of production and together with income from other sources amounted to a total of £61,126 against £52,638 previously.

Year to Dec. 31	Total Revenue Sales of Tin-ore	Other Income	Nigerian Mining Costs*	Net Profit	Divi- dends	Carry Forward
£	£	£	£	£	£	£
1953	59,908	1,218	39,995	3,297	3,667	2,745
1952	51,615	1,023	35,409	3,678†	3,604	2,990

\* Excluding other expenses of £10,849 (1952—£3,751) in addition to which £4,870 (Cr. £1,960) represent stock losses and profits.

† Before £2,249 being debits against amount written off and provision for profits tax.

The same total distribution of 33½ per cent on the company's ordinary issued capital of £20,000 in 2s. per share was made as for the previous year.

Prospects for the current year, however, do not appear to be bright due to the temporary suspension of work at the Werran River paddock, and on the Werran areas which have now been cleaned up completely. Meeting, July 13, London. Captain Hugh Vivian is chairman.

### Kent (F.M.S.) Forecasts Reduced Output

Dredging activities on the Batu River, carried out by Kent (F.M.S.) Tin Dredging during the year to December 31, 1953, were conducted in lower grade ground than in the previous year which more than offset the increased volume of ground treated and tin ore recovered fell by approximately 63 tons.

Year to Dec. 31	Total Revenue Mining	Other	Net* Profit	Divi- dend	To Reserve	Carry Forward
£	£	£	£	£	£	£
1953	216,914	4,646	80,015	28,875	15,000	33,608
1952	331,647	4,319	165,011	38,587	13,873	31,843

\* After expenses including Mining Costs of £93,877 (1952—£95,395)

Lower sales of tin ore at 415 tons compared with 478 tons previously, together with a drop of £145 in the average tin price received during the year to a level of £427 (£478) not unexpectedly resulted in a considerable decline in earnings.

Year to Dec. 31	Cu. yd. Treated (000)	Per cubic yard Yield (lb.)	Cost (pence)	Output (tons)	Price rec'd*
£					£
1953	1,601.4	0.59	14.07	414.7	£427
1952	1,531.0	0.69	14.96	477.6	£572

\* Less tribute

Dividends amounting to 50 per cent, compared with 70 per cent for the previous year, were paid on the company's issued ordinary capital of £105,000 in shares of 2s. each.

In his statement to shareholders Mr. W. E. Hosking, the chairman, forecast a somewhat reduced rate of output for the current year due to the lower value of the ground to be treated. Tin ore produced during the first three months of the current year amounted to 95 tons against 122½ tons in the corresponding period of the previous year. Mr. W. E. Hosking is chairman. Meeting, July 21, Redruth, Cornwall.



## Company Shorts

**Tinto Reaches Terms With Spanish Interests.**—Following the recent sporadic announcements regarding the sale of the Rio Tinto's Spanish mines, the terms of an agreement have now emerged from negotiations which have been in progress and will soon be submitted to shareholders for approval. These terms take the form of three basic proposals; firstly, that a new Spanish company will be formed to take over Tinto's interests in Spain, secondly, that a sum of £7,666,666 will be paid to Rio Tinto in sterling in London by instalments, together with one-third of the new company which will be passed to Rio Tinto and two-thirds being purchased by the Spanish interests. Lastly, Rio Tinto will continue to carry out technical services for the new company and also provide commercial services in London for the sale of export products.

**R.S.T. Group's Incorporation in N. Rhodesia.**—It has been announced by the boards of Rhodesian Selection Trust, Mufulira Copper Mines and Roan Antelope Copper Mines that appropriate steps have now been taken whereby those companies have as from July 1, 1954, ceased to be incorporated in the United Kingdom and are now companies incorporated in Northern Rhodesia under the provisions of the Companies Ordinance of Northern Rhodesia.

**G.M. of Australia's Uranium Discoveries.**—It has been announced by Gold Mines of Australia that leases have been applied for and options secured over two areas known as Tinboll and Hot Rocks in the Cloncurry district of North Queensland where the company is searching for uranium.

At the former, although specimens varying from .12 per cent up to .37 per cent uranium oxide have been obtained, these values are not regarded as being payable and their significance lies only in the identification of uranium minerals. At Hot Rocks only limited information is available, but values and quantities disclosed would appear to be of considerably less importance than those at Tinboll. Nevertheless, in both of these areas initial prospecting will be commenced by Gold Mines of Australia together with the Western Mining Corporation. It will be recalled that W.M.C. has the right to a 75 per cent participation in all Gold Mines of Australia's uranium activities against the company's own participation which is limited to 25 per cent.

**Bid for Boulder Perseverance.**—A recent announcement by Boulder Perseverance Gold Mine, which adjoins the South Kalgurli property on the Golden Mile in Western Australia, discloses that un-named interests have expressed their desire to purchase the whole of the company's stock. Stockholders, the announcement adds, will be kept fully informed of the position. It is also stated that operations during the year ended March 31, 1954, were satisfactory and that it is intended to issue the annual report and accounts as soon as possible. Apart from its own mine, the company's principal interests are 65 per cent of Kalgoorlie Enterprise Mines and 67 per cent of Kalgoorlie Ore Treatment Company.

**Capital Re-organization by Sir Lindsay Parkinson.**—Although no new capital is sought by Sir Lindsay Parkinson and Co. at present, it is because of the difficulties which would arise in raising new money, should this be necessary in the future, that a scheme of capital re-organization is submitted to shareholders.

Under this scheme, which would be retrospective, it is proposed that £350,000 5 per cent cumulative participating preferred ordinary stock should be converted into £350,000 6½ per cent cumulative preference stock without further participating rights. Holders of this stock would then by way of compensation for loss of participating rights receive a capital bonus issue of one fully paid £1 ordinary share for each seven £1 units of preferred ordinary stock held. In addition it is proposed that the holders of the ordinary stock should receive a capital bonus issue of one fully paid £1 ordinary share for every four £1 units held, for which the amount of £100,000 required would be provided by capitalization of reserves.

If this scheme is approved the company's capital will consist of £350,000 6½ per cent cumulative preference stock and £300,000 ordinary stock in respect of both of which the new dividend rights would be effective as from January 1, 1954.

**S.W. Africa Co. Defers Interim.**—Although it has been announced by the S.W. Africa Co. that profits earned during the year to June 30, 1954, are likely to be substantially higher than those of the previous year the payment of an interim dividend by the company has been deferred.

This is due to the company's present inability to make an accurate assessment of future capital needs for the further development of the Abenab West mine and of other properties owned elsewhere. Moreover, until the company's future finan-

cial commitments can be more precisely assessed it has been decided to defer the arrangements which had been in progress for raising new capital. Meanwhile, the provision of temporary finance has been arranged.

**Ex-Lands Earns Less Pays Less.**—During the year ended December 31, 1953, the profit before taxation earned by Ex-Lands Nigeria amounted to £48,545 compared with £155,123 previously. After taxation of £25,250 against £86,000 for the preceding year, together with a loss of £10,956 on sales of investments and properties and depreciation of £58,956, a final dividend of 20 per cent, or 4.8d. per stock unit of 2s. which, as no interim dividend was paid, is the total for the year, was recommended on the company's issued capital of £200,000. This compares with 50 per cent paid in respect of the previous year.

**Bisichi Tin Earns More Pays More.**—A sharply increased total revenue at £360,063, as compared with £270,670 previously, was the result of operations during the year ended December 31, 1953, carried out by Bisichi Tin Co. (Nigeria). From this total, however, the greatly increased tax liability of £236,500 against £189,000 previously, left a net profit of £123,563 (£81,670) from which dividends amounting to 40 per cent (35 per cent) on the company's issued capital of £460,000 in 2s. 6d. shares absorbed a total of £101,200 (£86,250), leaving a credit balance to be carried forward of £79,569 against £57,206 previously.

**Sungei Kinta Pays 5 Per Cent.**—Sales of tin-ore production and tribute, together with other sundry income, brought in £100,171 during Sungei Kinta Tin Dredging Company's last financial year which ended on December 31, 1953, as compared with £128,533 in the preceding period. After expenses in London and in the East, depreciation and taxation, etc., the company's net profit for the year was £5,225 as compared with £10,346 previously. From this total a dividend of 1s. per stock unit of £1, or 5 per cent, was paid on the company's issued capital of £200,000 which compares with 2s. per stock unit, or 10 per cent, paid in respect of the previous year. Mr. R. E. Binns is chairman. Meeting, London, July 13.

VACANCY arising shortly for qualified MINING ENGINEER to manage smallish property producing tin and associated minerals in Nigeria. Good salary and prospects offered to right man. Reply Box No. 556, The Mining Journal Ltd., 15 Wilson Street, Moorgate, London, E.C.2.

SURVEYOR/GEOLOGIST required by gold dredging company in British Guiana. Qualifications A.R.S.M., A.C.S.M., or equivalent. Experience of alluvial mine surveying, prospecting of alluvials for precious and base metal ores and calculation of ore reserves desirable, but recent graduates would be considered. Salary £750 to £1,250 p.a. depending on qualifications and experience, plus overseas allowance £250; marriage allowance £100. Free furnished quarters provided. Two year tour with four months' leave and free passages. Apply in writing to Personnel, Colonial Development Corporation, 33 Hill Street, London, W.1, stating age, qualifications and experience and quoting Serial 208.

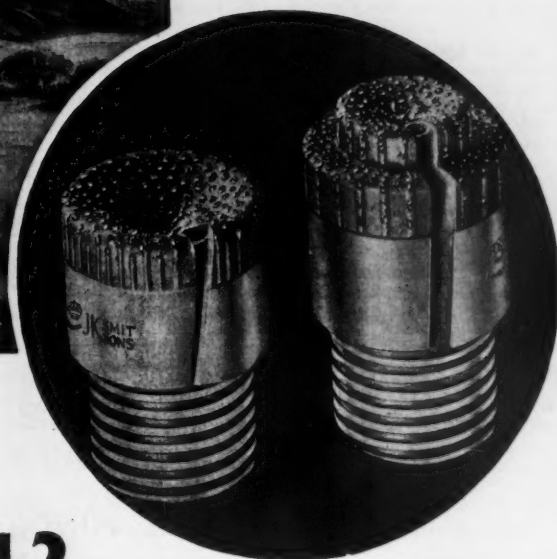
### CAMBORNE SCHOOL OF METALLIFEROUS MINING

Applications are invited for the position of SENIOR LECTURER in the Mining Department.

Applicants, preferably not over 45 years of age, must be able to satisfy the medical requirements of the Ministry of Education, and should have good academic qualifications, together with professional experience in one of the major fields of metalliferous mining, which will satisfy the requirements of the Board of Governors. In addition, some alluvial and open-cast mining experience is desirable. It is hoped that the successful candidate will be able to commence his duties at the beginning of the autumn term (September 22, 1954) but a later starting date will be acceptable for a suitable candidate.

The present salary scale is £940-£1,040.

Applications, giving full details, should be submitted not later than August 25, 1954, to the Secretary, Camborne School of Metalliferous Mining, Cornwall, from whom forms of application may be obtained.



## How hard is a diamond?

Most people know that the diamond is the hardest substance in the world. It is made in the volcanic crucible of Mother Earth, in unimaginable heat. The next hardest natural substance is corundum, of which the sapphire and ruby are familiar forms.

Modern Science has produced other materials which because of their hardness are widely used in industry, but none of them approach the hardness of diamonds. Tungsten Carbide is one of these materials which is in universal use, but to get the best results diamonds are needed to dress it. They do it with ease. That

gives you an idea of the hardness of the diamond. The development of diamond coring technique has brought about a combination of diamonds and tungsten in the Smit bits.

In Smit diamond coring bits the diamonds are set in special tungsten alloys, with the result that they have proved to be the most economical you can use in practically all formations.

It will pay you to consult Smit's upon any question of diamond coring in any field. We can help you to better, faster drilling.

### **J. K. SMIT & SONS (DIAMOND TOOLS) LTD.**

Mining Division: 22-24, Ely Place, Holborn Circus, London, E.C.1

Telephone: ★ HOLborn 6451

And at COVENTRY: Holyhead Chambers, Holyhead Road (Coventry 5215)

MANCHESTER: 2, St. John Street (BLAckfriars 0443)

Works: COLWYN BAY (Colwyn Bay 2062 and 2291)

## FRONTINO GOLD MINES

The Annual General Meeting of Frontino Gold Mines, Limited, was held in London on Wednesday last.

**The Rt. Hon. Lord Rathcavan, P.C.** (Chairman), who presided, in the course of his speech said:

The accounts for the year show a profit of £30,103 as against £37,680 in 1952, a decrease of £7,577. The reason for the lower income is due to the fact that production in the year was down by 6,600 oz. gold. Shareholders will recall that in my remarks last year I stated that because of the necessity to conserve the reserves of ore in Silencio, the Board had authorized the mining of a lower grade of ore and that a target of 4,500 oz. gold monthly had been set. This target was attained, and the lower output was made economically profitable by reason of the gold bonus of 30 pesos an oz. which we received during the first half of the year.

The Board recommend the payment on July 8 next of a final dividend of 1s. per share on the Preference shares, and a final dividend of 1s. 6d. per £1 stock on the Ordinary stock.

Now a word or two about the gold bonus and the exchange rate.

As you know, for some time past we received from the Colombian Mining Association, from funds derived from the premium on gold sales in the free market, a bonus in pesos based on the number of oz. of gold produced. This bonus which began in 1948 started at 6 pesos an oz., but was increased from time to time, and in October, 1952, it reached 30 pesos an oz. We never had any guarantee that it would be continued indefinitely, and it actually came to an end shortly after the last annual meeting through the exhaustion of the funds from which it had been paid. In place of this bonus the Government introduced a somewhat complicated measure which, broadly speaking, permits gold producers to export their gold for sale in the free market, and to sell the whole or part of the resulting currency proceeds, or Mining dollars as they are called, for pesos at the best price obtainable. Up to the end of the year these dollars were sold at a price well above par, and whilst the arrangement was not nearly as satisfactory as the bonus system, no immediate alteration was made in our mining policy, as the price of the Mining dollars continued to rise, and it was hoped that in 1954 they would reach a price which would give a premium comparable with the

previous 30 pesos bonus. Unfortunately, our hopes have not materialized and, in fact, the exchange premium has largely disappeared, as has the dollar premium on sales of gold in the free market. In these circumstances we have joined cause with other members of the industry in Colombia in asking for some form of Governmental assistance. Unless we get this we cannot continue to operate profitably without unduly straining the Mine, and so hastening its end. You may rest assured that everything that can be done to bring our difficulties to the notice of the authorities has been done. Mr. Gilbert and I went out to Colombia early this year and in March we were in Medellin and Bogota accompanied by our General Manager, where we put our case before the Cabinet Ministers and others in high places. Nevertheless, whilst many schemes and proposals have been considered, nothing has so far been conceded. We shall continue our efforts to obtain some concession.

Production in 1953 amounted to 116,274 tons milled, compared with 117,323 tons in 1952, and 55,465 oz. of gold and 48,975 oz. of silver were recovered as against 62,121 oz. and 56,264 oz. respectively last year, a decrease of 6,656 oz. gold and 7,289 oz. silver. The production of lead was continued and resulted in a recovery of 667 tons of concentrates which, it is estimated, will produce about 334 tons of lead, 488 oz. of gold, and 30,694 oz. of silver.

The total development in the year was 15,602 ft. and compares with 14,561 ft. last year. Of this development, 1,770 ft. in the drives averaged 27 dwt. over 47 in., 1,695 ft. in the rises averaged 27 dwt. over 43 in., and 111 ft. in the winzes averaged 50 dwt. over 54 in., making a total of 3,636 ft. with an average of 28 dwt. over 43 in. Last year the total was 2,776 ft., averaging 25 dwt. over 38 in.

At December 31 the proved reserves of ore were 177,930 mill tons in Silencio and 3,140 mill tons in Cristales, making a total of 181,070 tons of an average value of 17.5 dwt. per ton, as against 186,804 mill tons of an average value of 15.7 dwt. per ton last year.

The Labour Pact ended on September 1, 1953, and the discussions which preceded the signing of a new Pact were protracted and difficult, but they were conducted amicably on both sides. Eventually a new collective agreement was concluded in October, for a period of 2½ years.

The report and accounts were adopted.

## THE CENTRAL MINING—RAND MINES GROUP

### DIVIDENDS—JUNE, 1954

The following dividends payable to shareholders registered in the books of the Companies at the close of business on June 30, 1954, will be paid on or after August 6, 1954. The dividends on shares to bearer will be paid after surrender of the appropriate coupons at the Office of the London Secretaries of the Companies, 4 London Wall Buildings, E.C.2, or, with the exception of the Company marked with an asterisk, at the Crédit Lyonnais, Paris.

The dividends will be payable in British currency, at par, at the rates declared in South African currency (Column No. 4), less South African non-resident shareholders' tax (Column No. 5).

NAME OF COMPANY (Each incorporated in the Union of South Africa.)	Divi- dend No.	Cou- pon No.	Amount of dividend declared per share	Deduction in respect of South African non-resident shareholders' tax, per share	Amount of dividend after such deduction, per share	Provisional allowance of credit authorized in the £	Gross amount of dividend, per share	Rate of South African taxation applicable in the £	Rate of deduction of United Kingdom income tax in the £	Amount of United Kingdom income tax deducted, per share	Net amount of dividend per share
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Blyvooruitzicht G. M. Co., Ltd. ....	17	—	1 2	1 05	1 095	4 6	1 471	—	4 6	3 76	9 19
City Deep, Limited. ....	69	69	6	0 45	5 55	4 6	7 16	7 4	4 6	1 61	3 94
Consolidated M. Reef M. & E. Ltd. ....	89	86	1 9	1 575	1 7425	4 6	2 1065	—	4 6	5 640	1 1 785
Crown Mines, Limited. ....	106	106	3 0	2 70	2 930	3 6	3 436	—	5 6	11 10	1 10 20
Durban Roodepoort Deep, Limited. ....	67	67	1 6	1 35	1 4 65	4 6	1 9 48	—	4 6	4 83	11 82
East Rand Prop. Mines, Limited. ....	69	70	1 9	1 575	1 7425	4 6	2 1065	—	4 6	5 640	1 1 785
Modderfontein East, Ltd. ....	54	35	1 6	1 35	1 4 65	4 6	1 9 48	—	4 6	4 83	11 82
Pretoria Portland Cement Co. Ltd. ....	93	—	1 9	1 40175	1 759825	4 6	2 128806	—	4 6	5 68981	1 1 90844
Rand Mines, Limited. ....	102	102	3 0	2 70	2 930	4 6	3 6 97	—	4 6	9 67	1 11 63
*Transvaal Gold M. Ests., Ltd. ....	87	87	6	0 45	5 55	3 3	6 63	—	5 9	1 91	3 64

Where no figures are shown in Column No. 9, the rates of South African taxation applicable in the £ cannot yet be ascertained, as they are dependent on the final particulars of the South African taxation of the companies concerned which are not yet available.

### PAYMENT OF COUPONS

COUPONS presented for payment at the Office of the London Secretaries will, unless accompanied by Inland Revenue declarations, be paid at the rates shown in Column No. 12, which are arrived at after deduction of United Kingdom income tax (Column No. 11), at rates reduced to allow of relief in respect of Dominion taxes (Column No. 10). If accompanied by Inland Revenue declarations, they will be paid at the rates shown in Column No. 6. They must be left at least four clear days for examination and may be presented any day (Saturdays excepted) between the hours of 11 and 2. Depositors will be notified at the time of deposit when the cheques will be ready. LISTING FORMS may be had on application.

COUPONS presented at the Crédit Lyonnais, Paris, will be subject to the deduction of French income tax from the amounts of the dividends shown in Column No. 6.

Note: The Companies have been asked by the Commissioners of Inland Revenue to state:—

Under the provisions of Section 348 and the 17th Schedule of the Income Tax Act, 1952, as amended by Section 26 of the Finance Act, 1953, relating to "unilateral relief" from double taxation, South African tax applicable to the dividends is allowable as a credit against the United Kingdom tax payable in respect of the dividends. The deduction of tax at the reduced rates in the £ (Column No. 10) instead of at the Standard Rate of 9s. 0d. in the £ represents a provisional allowance of credit at the rates shown in Column No. 7. The final rate of credit allowable to a particular shareholder depends on his personal rate of tax and may be more or less than the rates shown in Column No. 7. Revision of the credit involves corresponding adjustments of the gross amounts of the dividends for United Kingdom tax purposes (Column No. 8).

THE GROSS AMOUNT OF THE DIVIDEND, PER SHARE, TO BE INCLUDED IN ANY STATEMENT OF TOTAL INCOME FOR UNITED KINGDOM INCOME TAX PURPOSES IS SHOWN IN COLUMN NO. 8.

4 London Wall Buildings, London, E.C.2.  
July 2, 1954.

A. MOIR & CO.,  
London Secretaries of the above-named Companies.



# Metal and Mineral Trades

## A. STRAUSS & CO. LTD.

FOUNDED 1875

PLANTATION HOUSE, MINCING LANE, LONDON, E.C.3

### METALS

Telephone: Mincing Lane 5551 (10 lines)  
Telegrams: Straussar Phone London

### RUBBER

Telephone: Mansion House 9082 (3 lines)  
Telegrams: Ascorub Phone London

Telex GB LN 8058

**MERCHANTS**

**EXPORTERS**

**IMPORTERS**

Non-Ferrous Metals — Virgin, Alloys, Scrap

RUBBER

COPPER REFINERS

Sole Agents for MUREX Fire Refined Copper

Members of the London Metal Exchange

Dealer Members of the Rubber Trade Association

Members of the National Association of Non-Ferrous Scrap Metal Merchants

## CONSOLIDATED TIN SMELTERS, LIMITED.

ST. SWITHIN'S HOUSE, 11/12 ST. SWITHIN'S LANE, LONDON, E.C.4

Telephone: MANelson House 2164/7

Telegrams: CONSMELTER, PHONEE LONDON

PROPRIETORS OF THE FOLLOWING BRANDS OF LAMB & FLAG AND STRAITS TIN

**ENGLISH**  
(COMMON & REFINED)

**CORNISH  
MELLANEAR  
PENPOLL**

**STRAITS E. S. COY., LTD., PENANG**

BUYERS OF ALL CLASSES OF TIN ORES

Sole Selling Agents: VIVIAN, YOUNGER & BOND, LIMITED

PRINCES HOUSE, 95 GRESHAM STREET, LONDON, E.C.2

Telephone: MONarch 7221/7

Telegrams:  
"BASSETT, PHONE, LONDON."

Telephone:  
MANSHION HOUSE 4401/3.

## BASSETT SMITH & Co. Ltd.

(Incorporating George Smith & Son)

15/18 LIME ST., LONDON, E.C.3

**METALS,**

**ORES** (Copper, Zinc, Lead, &c., Complex),  
**RESIDUES, SKIMMINGS & ASHES**  
**NON-FERROUS SCRAP**

ESTABLISHED 1869

## BLACKWELL'S METALLURGICAL WORKS LTD. THERMETAL HOUSE, GARSTON, LIVERPOOL 19

**MAKERS OF  
FERRO ALLOYS, NON-FERROUS ALLOYS  
RARE METALS**

**BUYERS AND CONSUMERS OF  
COLUMBITE, TANTALITE, TUNGSTEN  
MANGANESE and all ORES**

Works, Garston.

Telegrams: Blackwell, Liverpool

Cable Address: WAHCHANG, NEW YORK

## WAH CHANG CORPORATION

(FORMERLY WAH CHANG TRADING CORPORATION)

233 BROADWAY

NEW YORK 7, NEW YORK

## TUNGSTEN TIN

### BUYERS

Tungsten Concentrates, Tungsten Tin Concentrates  
Mixed Tungsten Ores  
Tungsten Tailings, Scrap, Tips, Grindings  
Tin Concentrates—Tin Dross, Tin Furnace Bottoms

### SELLERS

Tungsten Concentrates to Buyers' Specifications  
Tungsten Salts, Tungsten Powder  
Tungsten Rods and Wires  
Tin Ingots, Tin Oxides, Tin Chlorides

PLANT—GLEN COVE, NEW YORK

**GEORGE T. HOLLOWAY**

&amp; CO. LTD.

METALLURGISTS & ASSAYERS,  
ORE TESTING, WORKS AND  
METALLURGICAL RESEARCH LABORATORIES

Atlas Road, Victoria Road, Acton,  
LONDON, N.W.10

Telephone No.:  
ELGAR 5202

Tels. & Cables:  
NEOLITHIC LONDON

**BARNET NON-FERROUS METAL CO.**

Elektron House, Brookhill Road, New Barnet, Herts.  
Phone: Barnet 5187 and 3901

STOCKISTS OF: Aluminium, Brass and Copper  
BUYERS OF: all non-ferrous scrap

*The RIGHT firm to deal with*

**DINESEN & MORRIS Ltd.**

EXPORTERS OF  
GALV. SHEETS — WIRE PRODUCTS  
ALL TYPES OF STEEL  
ALSO DEFECTIVES

**NON-FERROUS METALS**

MONARCH  
2642  
(4 lines)

CITY GATE HOUSE  
FINSBURY SQUARE  
LONDON, E.C.2.

CABLES:  
DINSMORR  
LONDON

**P. & W. MACLELLAN LTD.**

129 TRONGATE, GLASGOW

NON-FERROUS METALS all classes  
INGOT SCRAP MANUFACTURED

Letters: P.O. Box 95 Glasgow  
Telegrams: Maclellan, Glasgow Telephone: Bell 3403 (20 lines)

**ESSEX METALLURGICAL**

(F. L. Jameson, A.M.I.M.M.)

**Assayers and Samplers**

*On London Metal Exchange List of assayers and samplers*

Laboratories and Offices:

13 Woodhouse Grove, London, E.12

Telephone: GRAngewood 4364

Grams: Assaycury, Forgate, London Cables: Assaycury, London

Cables: AYRTON—NEW YORK

Telephone: CIRCLE 6—7667

**AYRTON METAL COMPANY**

30 ROCKEFELLER PLAZA INC. NEW YORK

Members of Commodity Exchange, Inc., American Tin Trade Association, Inc.

IMPORTERS OF  
WOLFRAM — MANGANESE  
CHROME—ANTIMONY ORES

DEALERS IN  
PLATINUM — GOLD — SILVER

*Buyers of crude platinum*

U.S. Agents for  
AYRTON METALS LTD. 10—13 Dominion St., London, E.C.2  
MEMBERS OF THE LONDON METAL EXCHANGE

**RHONDDA METAL CO. LTD.**

1 HAY HILL, BERKELEY SQ., LONDON, W.1

Works: PORTH, GLAM.

PHOSPHOR COPPER  
PHOSPHOR BRONZE, LEAD BRONZE,  
GUNMETAL, BRASS

Telephone: MAYFAIR 4654

Cables: RONDAMET

**COLLINGRIDGE & CO., LTD.**

*Refiners of all precious metal wastes*

Buyers of:—MERCURY (Quicksilver) and all scrap  
materials containing GOLD, SILVER, PLATI-  
NUM, etc. Aircraft Plugs, Silver Solder, Copper/  
Silver Alloys, Platinum and Silver Contacts, Photo-  
graphic Residues, Old English Gilt Picture Frames,  
Old Films.

RIVERSIDE WORKS, RIVERSIDE ROAD,  
WATFORD, HERTS.

Tel.: Watford 5963

Estd. 1800

**BELGRAVE (Buyers and Sellers)**

Always Buying Scrap Mercury; any quantity, containers sup-  
plied; maximum prices; also platinum and silver contacts,  
aircraft plugs, solders, and precious metal wastes. Please  
forward samples.

5 BELGRAVE GARDENS, LONDON, N.W.8  
Phone MA1 7513

**MINING & CHEMICAL PRODUCTS, LTD.**

86, STRAND, W.C.2

Telephone: Temple Bar 6511/3

Telegrams: "MINCHEPRO, LONDON"

Works: ALPERTON

WEMBLEY, MIDDLESEX

*Buyers of Silver Ores and Concentrates*

Smelters and Refiners of

**BISMUTH**

ORES, RESIDUES & METAL

Manufacturers of:

FUSIBLE ALLOYS, SOLDER, WHITE METALS,  
ANODES OF TIN, CADMIUM and ZINC IN  
ALL SHAPES

Importers and Distributors of:

ARSENIC . BISMUTH . CADMIUM  
INDIUM . SELENIUM . TELLURIUM

Telephone : AMHERST 2211 (six lines)

## E. AUSTIN & SONS

(London) LIMITED

**ATLAS WHARF**  
**Hackney Wick, London, E.9**

*Are Buyers of all scrap*  
**NON-FERROUS METALS,**  
**GUNMETAL, ALUMINIUM,**  
**COPPER, BRASS, LEAD, Etc.**

*Manufacturers of*  
**INGOT BRASS, GUNMETAL**  
**& COPPER ALLOYS, INGOT**  
**LEAD, TYPE METAL, ZINC,**  
**Etc.**

## EVERITT & Co. LTD.

40 CHAPEL STREET  
LIVERPOOL

Teleg. Address: Persistent, Liverpool

Phone: 2995 Central

**SPECIALITY:**  
**MANGANESE PEROXIDE ORES**

*We are buyers of:*  
**WOLFRAM, SCHEELITE, VANADIUM,**  
**MOLYBDENITE, ILMENITE, RUTILE,**  
**ZIRCONIUM and TANTALITE ORES**

*Suppliers of:*  
**FERRO-ALLOYS & METALS, NON-FERROUS ALLOYS**

## METAL TRADERS LTD.

7 GRACECHURCH ST., LONDON, E.C.3

Telegrams :  
Serolatem, Stock, London

Telephone :  
MANsion House 7275/6/7

*Buyers and Sellers of*  
**NON-FERROUS METALS**  
**ORES AND MINERALS**

*New York Representative :*  
**Metal Traders Inc., 67 Wall Street**

## BROOKSIDE METAL CO. LTD.

(Owned by Metal Traders Ltd.)  
HONEYPOT LANE, STANMORE, MIDDX.

Telegrams :  
Aluminium, Stanmore

Telephone :  
EDGware 1646/7

*Buyers and Sellers of*  
**NON-FERROUS SCRAP METALS**

*Specialists in*  
**COPPER-BEARING MATERIALS**

## THE STRAITS TRADING COMPANY, LIMITED

*Head Office :*  
P.O. Box 700, OCEAN BUILDING, SINGAPORE

*Works :*  
SINGAPORE & PENANG

**"The Straits Trading Co., Ltd."**  
**Brand of Straits Tin**

## THE BRITISH TIN SMELTING COMPANY, LIMITED

*Works :* LITHERLAND, LIVERPOOL

*Smelters of Non-ferrous Residues and Scrap*

*London Agents :*

**W. E. MOULSDALE & CO., LTD.**  
2 Chantrey House, Eccleston Street, London, S.W.1  
Cables : Wemoulanco, London Telephone : SLOane 7288/9

**METAL  
SUPPLIES**  
*Ltd*

**SUPPLIERS OF**  
**PHOSPHOR COPPER**  
**PHOSPHOR TIN**  
**FERRO ALLOYS**  
**METALLIC CARBIDES & POWDERS**  
**LEAD PRODUCTS**

**AND ALL OTHER NON-FERROUS METALS**

**72 VICTORIA ST. LONDON S.W.1**

\*Phone: VICTORIA 1735 (3 lines).

\*Grams: METASUPS, WESPHONE.

Telegrams :  
NONFERMET  
TELEX, LONDON

Cables :  
NONFERMET  
LONDON

Telephone :  
MANSION HOUSE 4521  
(10 lines)

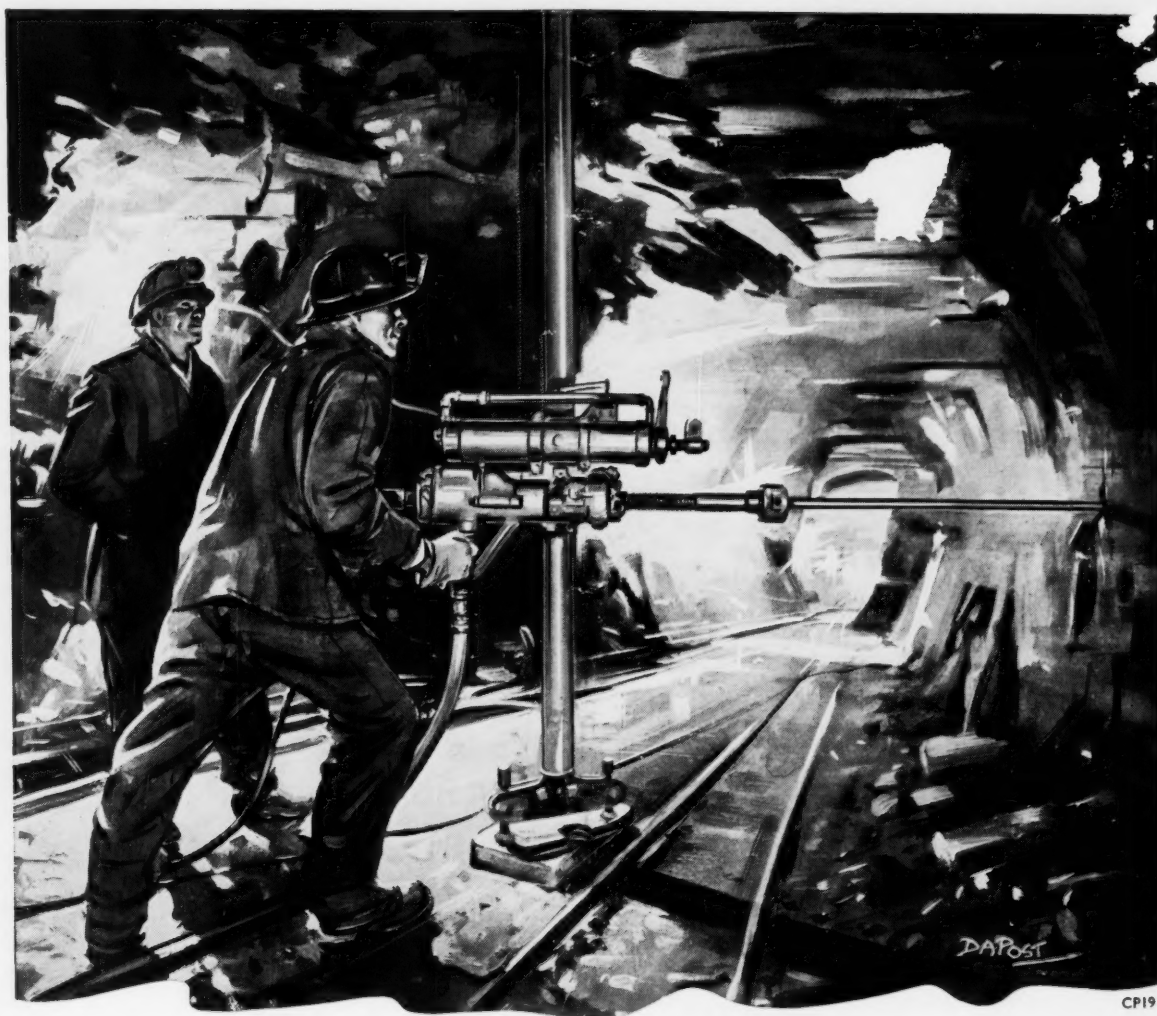
## HENRY GARDNER & CO. LTD.

**Non-Ferrous Metals**  
**and Semi-Manufactures,**  
**Ores, Minerals and Residues,**  
**Rubber**  
**Iron and Steel**  
**and General Merchandise**

**2 METAL EXCHANGE BUILDINGS**  
**LONDON, E.C.3**

**and at BIRMINGHAM, MANCHESTER, and GLASGOW**





CP19

## GROUND TESTING WITH A DIAMOND DRILL

50-ft. . . . 250-ft. . . . 500-ft. . . . the CP-55 Diamond Drill is built to do the job quickly and efficiently. Whether it be coring, blast hole drilling or grout hole drilling, this latest CP machine has all the features demanded by civil and mining engineers today . . . ample power, high capacity, self aligning rod puller, high torque air motor, spur gearing and solid construction. The CP-55 Diamond Drill certainly justifies its inclusion in the well known range of CP rock drilling equipment.

**FOR THE RIGHT APPROACH . . . THE RIGHT EQUIPMENT**

**CALL IN**

**Consolidated**

**CONSOLIDATED PNEUMATIC TOOL CO. LTD. · LONDON & FRASERBURGH**

Reg. Offices: 232 Dawes Road, London, S.W.6 · Offices at Glasgow · Newcastle · Manchester · Birmingham · Leeds · Bridgend · Belfast · Dublin · Johannesburg · Bombay · Melbourne · Paris · Rotterdam · Brussels · Milan · and principal cities throughout the World

Published by The Mining Journal Ltd., 15 Wilson Street, Moorgate, London, E.C.2, and printed by Washburn & Sons Ltd., 25-27 Queens Road, Southend-on-Sea, Essex. Registered as a Newspaper.